

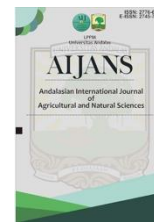


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Article

Effect Of Tamarillo (*Solanum Betaceum Cav.*) Addition On Physical And Chemical Characteristics Of Yoghurt Produced

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Article Information	Abstract
Received : 2024-03-10 Revised : 2024-03-25 Accepted : 2024-04-22 Published: 2024-05-07	Yoghurt is one of the milk-based fermented products, adding fruit juice to yoghurt is part of product innovation, expected to improve quality and consumer liking. This study aims to determine the effect and level of addition of tamarillo juice (<i>Solanum betaceum Cav.</i>) on the characteristics of yoghurt produced. This study used a complete randomized design (CRD) method with 5 treatments and 3 replicates. Data were analyzed using analysis of variance (ANOVA) and Duncan's New Multiple Range Test (DNMRT) at the 5% level. The treatment in this study was the addition of tamarillo juice as much as 0% (A), 5% (B), 10% (C), 15% (D), 20% (E). The results showed that the addition of tamarillo juice to yoghurt had a significant effect on viscosity, color, fat content, ash content, total solids, total lactic acid, and Organoleptic test (color, aroma, taste and consistency), but had no significant effect on protein content, pH value and total lactic acid bacteria. The best formulation was in treatment E (addition of 20% tamarillo juice) with an average viscosity value of 13.03 Cp; color 83.73 oHue (Yellow red); protein content 4.11%; fat content 3.29%; ash content 0.59%; total solids 19.17%; total lactic acid 1.04%; pH value 4.52; total lactic acid bacteria 2.3×10^9 CFU/g ; color 4.3 (like); aroma 4.25 (like); taste 4.15 (like) and consistency 4.25 (like).
Keywords Keyword; tamarillo essence, cow's milk, yoghurt	
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INTRODUCTION

Milk is a source of animal protein that has an important role for humans because it contains high and complete nutritional components. Milk is a white liquid secreted by the mammary glands in female mammals, for food and nutritional sources for their children such as cows, goats, buffaloes, horses and others. Efforts to diversify dairy products are needed because fresh milk is easily damaged. One of the efforts to reduce damage to dairy products is by fermenting milk. Yoghurt is one of the fermented milk products, the process of making fermented milk using *Lactobacillus bulgaricus* and *Streptococcus thermophilus* bacteria that will produce lactic acid and yoghurt flavor characteristics [1]. Yoghurt is also a product that is easier to digest compared to whole [2].

Adding fruit juice to the yoghurt making process is part of product innovation. Yoghurt with added flavors will improve the quality of taste and liking in consumers. Yoghurt making should be more likely to use natural fruit than synthetic flavors into yoghurt products [3]. One of the fruits that can be utilized in making yoghurt is tamarillo fruit (*Solanum betaceum Cav.*).

Tamarillo is one of the local commodities in Indonesia whose productivity is quite high, especially West Sumatra which is generally only consumed either eaten fresh, made syrup or juice drinks. Based on BPS (Central Bureau of Statistics) data [4], the harvest area of tamarillo fruit in West Sumatra in 2016 was 2,943 ha and in 2017 was 2,939 ha [4]. Tamarillo is a non-climacteric fruit that has a sour taste and contains many nutrients that are useful for health. Tamarillo contains natural antioxidant compounds found in the fruit, namely betacarotene and carotenoids and also contains vitamin C, several minerals such as selenium, copper, zinc, and manganese. The high fiber in the fruit is also useful for preventing cancer and constipation. One of the other advantages is that it can reduce high blood pressure [5].

Tamarillo still has a low selling price, especially during harvest season. However, the utilization of tamarillo as a commercial product is not too much. This fruit is mostly consumed directly. One of the utilization of tamarillo can be done as a mixture in making yoghurt. This study aims to determine the effect of adding tamarillo juice in making yoghurt on the characteristics of yoghurt produced

EXPERIMENTAL SECTION

Materials

The materials used in this study were fresh cow's milk obtained from dairy farms in Padang City. The starter used was a starter with the trademark Yoghurtmet, Culture de Yogourt (*S. thermophilus*, *L. bulgaricus* and *L. acidophilus*), tamarillo fruit obtained from the Padang city fair market. Additional ingredients used were sugar and skim milk. Chemicals used in the analysis were Selenium, concentrated H₂SO₄, distilled water, 50% NaOH, Hexane Solution, 0.1 N NaOH, phenolphthalein (PP), 1% amylum solution, 0.01 N Iod solution, DPPH reagent solution, methanol solution, Physiological Salt and MRSA media (deMann Rogosa Sharpe Agar).

Instrumentation

The equipment used during the study consisted of a basin, knife, scales, blender, filter cloth, analytical scales, measuring cup, glass jar, stainless steel pot, glass jar, stainless steel stirring spoon, thermometer, test tube, erlenmeyer, Petri dish, desiccator, oven, glass cup, kedjhal flask, fat flask, soxhlet extraction, pH meter, aluminum foil, spectrophotometer, separatory funnel, viscometer, measuring pipette, colony counter, autoclave, vortex, hot plate and Hunterlab colorflex Ez spectrophotometry.

Procedure

The implementation of the research includes preparation of materials, making tamarillo juice, making starter, making yoghurt with the addition of tamarillo juice with various concentrations and followed by analysis.

Preparation of Tamarillo juice [6].

The fruits are sorted to select ripe and undamaged fruits. The characteristic of a ripe tamarillo fruit is that the skin is red in color throughout. Then, the sorted tamarillo fruit is washed with clean running water. Then the skin is peeled and the pulp is taken. The fruit is cut and crushed using a blender with the addition of water 1: 1 (tamarillo: water) which produces fruit pulp. After that, the fruit pulp is filtered to get the filtrate in the form of fruit juice.

Preparation of starter (Procedure on Packaging)

A total of 1000 ml of cow's milk was put into a Stainless steel or glass container and heated using a hot plate at 70oC - 80 oC for 15 minutes, then the temperature was reduced to 45 oC. The inoculum was weighed as much as 5 g, then put into an erlenmeyer and added 100 ml of pure pasteurized cow's milk and shaken until the starter powder dissolved, then added another 900 ml of pasteurized milk so that the total became 1000 ml. The solution was stirred carefully until mixed, then put into an incubator for 5-6 hours at 40 - 45 oC.

Yoghurt Making (Modified Putri et.al., 2019 [7])

Fresh cow's milk as much as 200 ml is put into a container or glass jar and then pasteurized for 15 minutes at 75 oC. then skim milk and sugar are added. Then let stand until the temperature becomes 42 oC, then put the tamarillo juice according to the formulation and stirred. 10 ml of yoghurt bacteria starter was inoculated into a glass jar containing pasteurized milk and tamarillo juice. The glass jar was tightly closed using aluminum foil and incubated at 40-45 oC for 5-6 hours.

Observations

Observations made on raw materials, namely cow's milk, are pH, protein, fat and indications of milk damage. Observations made on the starter are lactic acid bacteria (LAB) test. Observations made on tamarillo fruit juice yoghurt are observations of physical properties, namely viscosity test and color test. Observation of chemical properties, namely protein content, fat content, ash content, total solids, total lactic acid, and organoleptic tests in the form of taste, aroma, appearance and consistency. Microbiological observations were total lactic acid bacteria

RESULT AND DISCUSSION

Raw materials

Analysis of raw materials was carried out on cow's milk and yoghurt starter , which included pH, protein, fat and alcohol tests and the number of lactic acid bacteria in the starter.

Table 1. Characteristics of cow's milk

Component	Average	SNI 3141.1:2011
pH	6,87 ± 0,05	6,3 – 6,6
Protein (%)	3,40 ± 0,01	Min 2,8 %
Fat (%)	3,36 ± 0,01	Min 3 %
Alcohol	Negative	Negative

The results of milk analysis in Table 2 show that fresh milk is in good condition and in accordance with the requirements of SNI 3141.1: 2011 [8] for fresh milk standards. Furthermore, the analysis carried out on yoghurt starter is the test of total lactic acid bacteria contained in the starter . From the results obtained, the average value of lactic acid bacteria in the starter from three replicates is 2.8×10^9 . While based on SNI: 2981-2009 regarding yoghurt for the number of lactic acid bacteria starter in yoghurt products is at least 10^7 .

Physical Characteristics and pH of Yoghurt

The physical properties of yoghurt observed were viscosity and color, the results of observations can be seen in Table 2. The results of the analysis of variance showed that the addition of tamarillo juice had a statistically significant effect at the $\alpha = 5\%$ level on the viscosity and color of tamarillo yoghurt.

Table 2. Results of analysis of physical properties of yoghurt.

Addition of tamarillo juice	Viscosity (cP)	Color (°hue)	Color Range	pH
A (0%)	7,71 ± 0,28 a	101,54 ± 0,01 e	Yellow Red	4,52 ± 0,21
B (5%)	8,30 ± 0,1 a	97,06 ± 0,03 d	Yellow Red	4,47 ± 0,16
C (10%)	10,46 ± 0,1 b	91,96 ± 0,03 c	Yellow Red	4,38 ± 0,09
D (15%)	11,20 ± 0,7 c	86,79 ± 0,04 b	Yellow Red	4,33 ± 0,06
E (20%)	13,03±0,3 d	83,73 ± 0,08 a	Yellow Red	4,28 ± 0,05

Notes: Numbers in the same column followed by different lowercase letters are significantly different according to DMNRT at the $\alpha = 5\%$ level.

Viscosity

Viscosity is a description of the resistance to fluid flow of a material. The viscosity value will be higher if the yoghurt texture is more compact. Based on Table 3, the results show that tamarillo yoghurt has an average viscosity ranging from 7.71 - 13.03 cP. The more tamarillo juice added, the higher the viscosity. This is thought to be because during the fermentation process, the lactose contained in the milk will be converted into lactic acid which causes the pH to drop to the casein isoelectric point (4.6) so that the coagulated casein clumps together to form a coagulum so that a semi-solid structure is formed [9]. According to Winarno and Fernandes (2007) [10], that yoghurt has a viscosity between 8.28-13.00 cP.

Color

Color is the main attraction of a food or drink because color can be seen. The higher the concentration of tamarillo juice added, the color of the yoghurt becomes slightly reddish, because the color of the tamarillo fruit flesh is yellow on the outer layer and red on the inner layer. The pink color is produced because it contains anthocyanin pigments, while the yellow color is obtained from carotene pigments.



Fig.1. Yoghurt with tamarillo juice addition research results

According to Astawan (2008) [11], anthocyanins found in tamarillo are a group of reddish-colored dyes that are soluble in water and can be used as food and beverage dyes. In addition, the color of tamarillo yoghurt is also determined by the raw milk used. According to [12], milk has a white to yellowish color, depending on the type of animal, feed, fat content, and solids contained in milk.

Degree of acidity (pH)

The pH value is closely related to the acid content produced. During fermentation, milk lactose will change into lactic acid, the addition of fruit juice can also affect the pH value and the number of lactic acid bacteria in yoghurt. Acid in yoghurt in addition to lactic acid there is also organic acid derived from the added tamarillo juice. So that the more lactic acid produced, the acidity increases and the pH decreases. In **Table 2.**, the pH of the resulting yoghurt product is 4.28 - 4.52, the more Dutch juice is added, the lower the pH. This research is in accordance with the research of Kartikasari and Nissa (2014) [2], on the pH value of yoghurt with the addition of soursop juice and the length of fermentation, showing the pH value of fruit yoghurt obtained was 4.2 - 4.5. The more the addition of soursop juice will cause a decrease in pH value, the decrease in pH is also influenced by the breakdown of organic compounds by bacteria in the product. Another study, Jannah, et al., (2014) [13], stated about the addition of star fruit extract to youghurt showed the pH value of yoghurt drink with the addition of star fruit extract decreased, ranging from 4.16 - 4.31. The decrease in yoghurt pH is influenced by the activity of LAB in breaking down lactose into lactic acid. color in milk is due to the dispersion of colloidal droplets of fat, calcium caseinate, and calcium phosphate. Carotene and riboflavin are the main ingredients that contribute to the yellow color of milk.

Chemical Characteristics of Yoghurt

The chemical properties of yoghurt observed were total solids, total acid, protein, fat and ash content. The observation data can be seen in **Table 3.** The results of the analysis of variance showed that the addition of tamarillo juice did not have a significant effect on

protein content, but had a significant effect on total solids, total acid, fat content and ash content at the $\alpha = 5\%$ level.

Table 3. Results of Chemical Properties Analysis of Tamarillo Yoghurt

Addition of tamarillo juice	Total Solids %	Total Acid %	Protein (%)	Fat (%)	Ash (%)
A (0%)	15,61 ± 0,08 a	1,24 ± 0,01 a	3,61 ± 0,27	3,56±0,06 c	0,31 ± 0,03 a
B (5%)	17,02 ± 0,48 b	1,27 ± 0,01 a b	3,82 ± 0,10	3,42 ± 0,08 b	0,44 ± 0,01 b
C (10%)	17,72 ± 0,24 b c	1,29 ± 0,03 b c	3,92 ± 0,20	3,39 ± 0,04 a b	0,49 ± 0,02 c
D (15%)	18,18 ± 0,34 c	1,32 ± 0,01 c	4,02 ± 0,28	3,36 ± 0,05 a b	0,52±0,01 d
E (20%)	19,17 ± 0,76 d	1,36 ± 0,01 d	4,11 ± 0,36	3,29 ± 0,04 a	0,59±0,01 e

The numbers in the same column followed by different lowercase letters are significantly different according to DMNRT at the $\alpha = 5\%$ level.

Total Solids

Total solids are the solid part of milk, the nutritional value contained in it consists of protein, fat, carbohydrates, vitamins, minerals that are insoluble in water. Based on Table 4, it can be seen that the average value of the percent of total solids of tamarillo yoghurt ranges from 15.61 - 19.17. Based on yoghurt standards according to SNI 2981: 2009, the value of total solids is at least 8.2%. Based on this, the value of total solids of tamarillo yoghurt is in accordance with the standards of SNI 2981: 2009.

The total solids value shows that treatment E yoghurt (addition of 20% tamarillo juice) produces the highest total solids value of 19.17%. While the lowest total solids value was found in treatment A (addition of 0% tamarillo juice), which was 15.61%. This indicates that tamarillo juice can affect the increase in total solids of yoghurt produced. According to Supriharti, Elmasni, and Sabri (2007) [14], tamarillo fruit contains 10.3 g carbohydrates, 1.5 g protein, and 0.06-1.28 g fat. From the nutritional content of the fruit above, it can be seen that the nutritional value of tamarillo juice is quite high, so that the total solids in yoghurt will increase along with the addition of increased tamarillo juice concentration. According to Achmad, Nurwantoro, and Mulyani (2012) [15], solids can consist of carbohydrates, proteins, fats, minerals and other content.

Total Acid

Total titratable acid is the amount of lactic acid formed during the fermentation process which is the result of the breakdown of lactose by lactic acid bacteria. The Yoghurt Quality

Standard (SNI 2891:1992) states that every yoghurt product must have a lactic acid content in the range of 0.5 - 2.0%, so it can be concluded that the tamarillo yoghurt product produced is in accordance with the SNI that has been determined.

The percentage of acid in yoghurt with the addition of tamarillo juice concentration shows an increase. Yoghurt with treatment E (addition of 20% tamarillo juice) is the best medium for the growth of microorganisms used. This condition can be seen by the increasing number of primary metabolites (lactic acid). The availability of more energy sources was utilized by lactic acid bacteria (LAB) during fermentation, so that the final metabolite in the form of lactic acid formed increased.

The pH value that decreases with the addition of tamarillo juice will increase the acid formed. This is in accordance with the opinion of Nakazawa (1992) [16], stating that acidity and pH values have a close relationship with increasing metabolic activity so that lactic acid production increases while the pH value decreases. In addition, Winarno and Fernandes (2007) [10] explained that lactic acid produced during the fermentation process can improve flavor and increase acidity or decrease pH.

Protein Content

Protein is one of the food nutrients that has the function of building and maintaining cells and body tissues [17]. From **Table 4**, it can be seen that the more tamarillo juice is added, the protein content of yoghurt also tends to increase.

The protein contained in yoghurt comes from milk and lactic acid bacteria cells contained therein. This is directly proportional to the increase in the number of lactic acid bacteria along with the increase in tamarillo juice concentration. According to Herawati and Wibawa (2009) [18], the greater the number of lactic acid bacteria in yoghurt, the higher the protein content, because most of the constituent components of lactic acid bacteria are proteins. This opinion is supported by Winarno and Fernandes (2007) [10], who say that the cell material of lactic acid bacteria is composed of protein. In addition, the protein content of yoghurt also comes from tamarillo which has a protein content of about 1.4 - 2% in 100 gr [19]. The protein content can help increase the protein content in yoghurt during the fermentation process. Furthermore, according to Susilorini and Sawitri (2007) [20], yoghurt protein in general is 4-6%. The results of this analysis show that the protein content of yoghurt with the addition of tamarillo juice meets the Indonesian National Standard in SNI 2981: 2009, which is at least 2.7%.

Fat Content

The fat content of yogurt decreases with increasing tamarillo juice added. This is because during fermentation, fat will be hydrolyzed into simpler compounds. Lactic acid bacteria produce the enzyme lipase so that fat is hydrolyzed and causes a decrease in fat content in yogurt. In addition, the decrease in fat content is also due to fat used by lactic acid bacteria for energy sources and flavor [21]. The results of tamarillo yogurt fat content have met the requirements of the Indonesian National Standard (SNI 2981: 2009) regarding yogurt fat content, which is at least 3.0%.

Ash Content

Ash is the residual combustion of organic matter which is the minerals contained in a food ingredient. The ash content of yoghurt with the addition of tamarillo juice has met the requirements of the Indonesian National Standard stipulated in SNI 2981: 2009 regarding the ash content of yoghurt, which is a maximum of 1%. The more the addition of tamarillo juice, the more the ash content of yogurt increases, this is because tamarillo contains various types of minerals. According to Kumalaningsih and Agniya (2006) [19], there are several minerals in tamarillo such as calcium 16-18 mg/100g, potassium 0.2 - 0.3 mg/100g, phosphorus 22 - 65 mg/100g, zinc 0.1 0.2 mg/100g and iron 0.3 - 0.9 mg/100g. The minerals contained in tamarillo will increase the minerals in the yogurt produced. So that the greater the concentration of tamarillo juice added in making yogurt, the greater the ash content produced.

Total Lactic Acid Bacteria

Lactic acid bacteria (LAB) are a group of bacteria that are beneficial because they can ferment sugar as an energy source and produce large amounts of lactic acid. Although LAB is also capable of breaking down proteins, it does not cause product spoilage [16].

Table 4. Total Lactic Acid Bacteria of Tamarillo Yoghurt

Addition of tamarillo juice	Lactic Acid Bacteria (CFU/g)
A (0%)	2,4 x 10 ⁸
B (5%)	2,5 x 10 ⁸
C (10%)	2,8 x 10 ⁸
D (15%)	2,1 x 10 ⁹
E (20%)	2,3 x 10 ⁹

The starter used in this study was Yogurtmet, Culture de Yogourt (*S. thermophilus*, *L. bulgaricus*, *L. acidophilus*) as much as 5% of the total substrate. From the results of this study, it can be seen that the addition of tamarillo juice to yogurt can increase the number of lactic acid bacteria produced. This result is in accordance with the research of Sutedjo and Nisa (2015) [22], which states that the higher the concentration of star fruit juice added and the longer the fermentation time, the average total LAB will increase. This is because the

nutritional components in milk strongly support the growth of LAB during fermentation, besides the addition of tamarillo juice causes the pH of the fermentation substrate to decrease, LAB is more suitable for growth at low pH [23].

The growth process of starter bacteria in yogurt making begins with an increase in the growth rate of *S. thermophilus* which produces lactic acid at low pH to optimize the growth of *L. acidophilus* and *L. bulgaricus* producing lactic acid which causes a decrease in pH [24].

Based on SNI 2981: 2009, the starter bacteria for yogurt as a fermented drink is at least 10^7 CFU/g. From the results of the study, it was found that the number of LAB in tamarillo yogurt in all treatments had met the standard of at least 10^7 CFU/g. So it can be said that tamarillo yogurt has the potential as one of the probiotic drinks that are beneficial for human digestive health.

Organoleptic Analysis of Yoghurt

Organoleptic testing of yogurt produced was carried out on color, aroma, taste and texture, the test results can be seen in Table 5.

Table 5. Organoleptic Results of Tamarillo Yoghurt Color

Addition of tamarillo juice	Color	Aroma	Taste	Consistency
A (0%)	3,15 ± 0,6	3,60 ± 0,8	3,65 ± 0,93	3,55 ± 0,6
B (5%)	3,75 ± 0,7	4,05 ± 0,9	3,25 ± 0,79	3,15 ± 0,75
C (10%)	3,55 ± 0,9	3,62 ± 0,8	3,60 ± 0,75	3,35 ± 0,67
D (15%)	3,55 ± 0,7	4,25 ± 0,9	3,95 ± 0,6	3,65 ± 0,59
E (20%)	4,29 ± 0,9	4,30 ± 0,7	4,15 ± 0,81	4,25 ± 0,72

Color

Color is an assessment of physical attributes that are assessed first when determining the quality process of food and can sometimes be used as a measure in determining the quality of food products. In Table 6, it can be seen that the highest average value for panelist acceptance of the color of tamarillo yogurt is in treatment E (Addition of 20% Tamarillo Juice), which is 4.3 and the lowest average value is in treatment A (Addition of 0% Tamarillo Juice), which is 3.15. The higher the concentration of tamarillo juice added, the higher the color. The higher the concentration of tamarillo juice added, the red color of tamarillo yogurt is produced. The red color produced comes from tamarillo which contains anthocyanin

compounds which belong to the water-soluble flavonoid group and can be used as food and beverage coloring [11].

Aroma

Aroma (odor) is an important factor in indicating the level of consumer acceptance and determining the delicacy of the food [10]. The aroma of tamarillo yogurt is a distinctive sour aroma like the aroma of yogurt in general. According to Munurung, Rusmarilin, and Ridwansyah (2014), the aroma of yogurt is produced by acetaldehyde which is a volatile byproduct of fermentation. The addition of tamarillo juice affects the aroma of yogurt so that it smells distinctive. The sour aroma is caused by the fermentation process by the bacteria *Lactobacillus bulgaricus*, *Streptococcus thermophilus* and *Lactobacillus acidophilus*. The three bacteria during lactose fermentation of milk produce lactic acid and other volatile substances. Tamarillo juice also has volatile components that affect the aroma of yoghurt, namely terpenoid, aromatic and ester compounds such as methyl hexanoate, ethyl hexanoate, terpinene-4-ol, and eugenol [25].

Taste

Taste is one of the most important components in food quality control, and determines the level of consumer acceptance of a food product. Based on the research that has been done, the results show that tamarillo yogurt has an average value of panelist preference for yogurt flavor ranging from 3.25 to 4.15 with the level of acceptance of panelists on a scale of ordinary to like.

The taste of yoghurt produced is influenced by the acid contained in the yoghurt. In Table 6, it can be seen that the highest panelist assessment of the taste of yogurt is in treatment E (Addition of 20% tamarillo juice) This shows that the addition of tamarillo juice will affect the sour taste of yogurt. The sour taste in yogurt is also caused by lactic acid formed during milk fermentation.

Consistency

Based on the research that has been done, the average value of panelists' liking of the consistency of tamarillo yogurt is 3.15-4.25 with the level of acceptance of panelists on a scale of ordinary to like. According to SNI 2981: 2009, the appearance or consistency of yogurt is a thick to dense liquid, which can be analyzed using the sense of sight (eye). According to Surajudin, Kusuma, and Purnomo (2005) [26] good yogurt is yogurt whose consistency is compact (homogeneous), no gas is formed and no separation of solids and liquids occurs. The five products in tamarillo yogurt produced are homogeneous. The consistency produced in this study is semi-solid, not too runny. The consistency of tamarillo

yogurt products that panelists liked the most was in treatment E (addition of 20% tamarillo juice) with a score of 4.25. The organoleptic radar of tamarillo yogurt can be seen in **Fig. 2**. From **Fig.2.**, it is obtained that the highest acceptance of yogurt is treatment E (addition of 20% tamarillo juice).

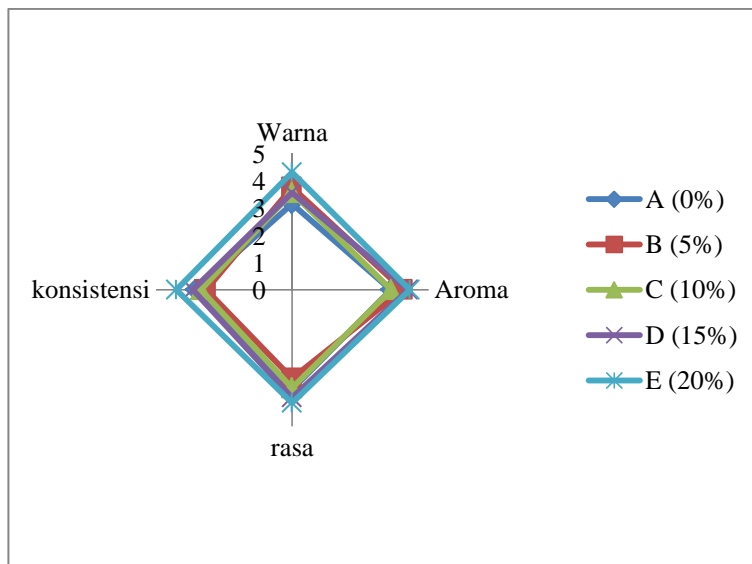


Fig.2. Organoleptic Radar Chart of Tamarillo Yoghurt

CONCLUSION

Based on the results of the research that has been done, it can be concluded that the addition of tamarillo juice to yogurt has a significant effect on viscosity, color, fat content, ash content, total solids, total lactic acid, but has no significant effect on protein content, and pH value. The best product of the research results is in treatment E (addition of 20% tamarillo juice) with an average viscosity value of 13.033 Cp, color 83.73 oHue (Yellow red), protein content 4.11%; fat content 3.29%; ash content 0.59%; total solids 19.17%; total lactic acid 1.04%; pH value 4.52; vitamin C content 39.31mg/100g; antioxidant activity 38.51%; total lactic acid bacteria 2.3×10^9 CFU/g ; color 4.3 (liked); aroma 4.25 (liked); taste 4.15 (liked) and consistency 4.25 (liked).

CONFLICT OF INTEREST

State that the authors have no conflict of interest.

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