

HEDONIC VALUE FOR PURPLE SWEET POTATO'S YOGURT DURING THE COVID-19 PANDEMIC

Meri Meri, Anindita Tri Kusuma Pratita

¹Program of Medical Laboratory Technique, STIKES BAKTI TUNAS HUSADA TASIKMALAYA, Indonesian

²Department of Pharmacy, STIKES BAKTI TUNAS HUSADA TASIKMALAYA, Indonesian

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ABSTRACT

The Covid-19 pandemic is a period when the body's endurance must be increased in order to avoid exposure to viral infections that cause the disease. Efforts to increase endurance can be made through exercise, a well-balanced diet, supplemental supplements, and other means. Consuming yogurt as a drink containing probiotics, which it plays a role in improving endurance. However, at this time, the dominant type of yogurt on the market is flavorings and synthetic dyes. Another alternative effort added to yoghurt is the addition of purple sweet potato (*Ipomoea batatas L*) to provide a natural and attractive color, as well as the antioxidant benefits contained in purple sweet potato, so that yogurt is made with enriched purple sweet potato. Purple sweet potato yogurt must be tested for favorites in order to be accepted in the community. The objective of this study is to explore the appearance of affection for purple sweet potato yoghurt during the Covid-19 pandemic. The method was tested experimentally with P1 only yogurt 100 percent treatment, P2 contains 50:50 yogurt and purple sweet potato, P3 contains 70:30 yogurt and purple sweet potato, and P4 contains 80:20 yogurt and purple sweet potato. Volunteers were given four bottles of yogurt (P1, P2, P3, and P4), tasted them, and then assigned a hedonic value based on the color, aroma, taste, and overall appearance. The points are assigned as follows: 1 (strongly dislike), 2 (dislike), 3 (less than like), 4 (likes), and 5 (strongly prefer). Hedonic value showed the mean P3 pick was (70:30). In conclusion, yogurt and purple sweet potato that people like is yoghurt with yoghurt composition as much as 70 parts and purple sweet potato 30 parts.

E-mail: meri@stikes-ac.id

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1. Introduction

The SARS-CoV-2 coronavirus is the virus that caused the Corona Virus Disease pandemic at the end of 2019, or Covid-19.[1]. Any individual who has low endurance will be susceptible to this viral infection. The virus will easily enter and spread throughout the body. The body's defense system will respond, but if the immune system is unable to block it, it will experience pain. In this pandemic situation, efforts to control the spread of the virus are needed, such as, washinghands, keeping a distance, using masks, avoiding crowds, the use of disinfectants, and increasing endurance [2]. One of the efforts to increase endurance is consuming foods or drinks that are nutritious and contain bioactive components that have antiviral and immune boosters. One of the immune boosters is yoghurt. According to Mohseni et al., 2021, yogurt has a significant protective influence on the incidence of COVID-19. Some research results also show the potential role of probiotics in modulating the immune system, which can balance the inflammatory response and increase the response to viruses[3].

Yogurt is the result of fermented milk, which is generally made from *Streptococcus thermophilus* and *Lactobacillus delbrueckii subsp. bulgaricus* bacteria that produce lactic acid. Other ingredients found in yogurt are calcium, potassium, zinc, and magnesium, as well as B vitamins, [4] which is very important for health. Yogurt in the market at this time is yogurt that predominantly contains flavoring ingredients and syntentic dyes that have an effect that will not be felt at the time of consuming it. In the long run, these synthetic flavorings and dyes can be detrimental to health.[5]. Therefore, in an effort to consume yogurt that is safe for health, it is necessary to make yogurt with the addition of ingredients that play an important role in efforts to increase endurance as well as natural dyes. Thus, there is a need for an alternative to making yogurt with the addition of purple sweet potatoes, whose content plays an important role in maintaining endurance. As in Gou research, Y, 2019 showed that the content in purple sweet potato can increase interleukin 10, and

reduce interleukin 6, interleukin 1, and TNF alpha [6].

Purple sweet potatoes contain anthocyanins, which act as antioxidants by inhibiting the production of free radicals, preventing them from damaging lymphocyte cells, which play a role in the body's immune system. Anthocyanins are cyanidin-3 glucosides that can boost the immune system and act as an antiviral influenza agent, as well as an immunomodulator that can lower the risk of degenerative diseases cardiovascular disease, atherosclerosis, and cancer In the current pandemic situation, purple sweet potatoes is among the foods that can be used as an antiviral and immune booster. [7].

Previous studies on purple sweet potato's yogurt several studies have been conducted on purple sweet potato's yogurt, such as Sayuti et al., 2013, who conducted a study on sweet corn yogurt with the addition of purple sweet potatoes extracts of 0%, 5%, 10%, and 15%.[8]; Rahma Novia Fadhilah (2018) investigated the production of yogurt by incorporating purple sweet potatoes flour, which is distinguished by "Difference in starters"[9]; Farhandhia Devangga, Bambang Dwiloka, and Nurwantoro, 2019, conducted a study on making yogurt with the addition of purple sweet potatoes from a different concentration of flour, tested for hedonic quality, viscosity, antioxidant activity, and acidity degrees.[10]. Agustina Intan Niken Tari and Catur Budi Handayani, Sri Hartati, 2019, conducted yogurt research enriched with the basic ingredients of purple sweet potatoes in extract form, which was tested on mice for immune system parameters, digestive health, and hematology[11].

According to the study's findings, purple sweet potatoes can be an ingredient that can enhance the benefits of yogurt, both in the form of flour and in the form of extracts. No one has provided any real information about the use of purple sweet potatoes in the form of pasta, which is added to fermented milk. As a result, in order to facilitate the processing of purple sweet potatoes, then the manufacture of yogurt is enriched with purple sweet potatoes in the form of pasta. The manufacture of this paste can be done on an industrial scale or in the home using simple tools. Purple sweet potatoes gives a natural color to yogurt, from anthocyanin content, so it will be safe for your health. In addition, when using probiotic drinks, purple sweet potato's yogurt must pass a popular test known as the hedonic test. This test is important so that the general public can enjoy yogurt-enriched purple sweet potatoes. Color, aroma, taste, and texture hedonic tests[12][13] It is necessary to know the tastes of consumers.

According to the preliminary e-survey results, yogurt is widely consumed by the public with various flavor innovations, such as the addition of fruits[14][9], honey, and synthetic flavorings. Therefore, the development of other innovations in yogurt drinks is needed so that people start looking at yogurt more and it can even be used as a daily necessity. Another innovation of yogurt products as an option with purple sweet potatoes-based has not been applied commercially. Making yogurt with purple sweet potatoes paste should be developed as an alternative choice in today's society, owing to its greater benefits during the Covid-19 pandemic and providing traction in terms of color that is purple from anthocyanins. Based on the background above, research was conducted on the description of hedonic tests on purple sweet potato's yogurt during the Covid-19 pandemic.

2. Research Methods

Research methods

The research method carried out is a description of the results of the hedonic test. The panelists who contributed were 33 people. Panelists are domiciled in the city of Tasikmalaya.

Research Etik Test

Submit ethics tests for research Then we wait for the results of health research ethics, which will be in the form of official certificates from KEPK STIKes Bakti Tunas Husada Tasikmalaya. No.143/kepk-bth/VI/2020 is the number of research ethics tests issued. If you have obtained the certificate number, you can begin your research. The research process begins with providing informed consent and an explanation of the research.

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Research Site

The research was conducted at the Laboratory D3 Study Program of Medical Laboratory STIKes BTH Tasikmalaya. Research time from December 2020 to July 2021.

Materials and Tools

The equipment used is an analytical balance sheet, an incubator, a spatula or small spoon, a plastic filter, a gas stove, a steaming pan, a stirrer, a funnel, a plastic packaging bottle of 50 ml, a plastic adhesive machine, a 1000 ml glass and a hand blender. The prepared ingredients are bacterial strains of lactic acid, water, branded skim milk, temperature gauge, pH gauge, timer, tissue, label, purple yam, granulated sugar, plastic shrink.

Making Purple Sweet Potato's Pasta

The skin's purple yam is peeled and cleaned with running water. The purple sweet potatoes is then cut into the shape of a dice (1 x 1 x 1 cm). Then 15 minutes of steaming [15]. After that, relax. After cooling, the purple yam is placed in a 1liter glass of 300 grams, followed by 300 mL of water [15] in a 1: 1 ratio. Mix in 120 grams of granulated sugar. Using a hand blender, puree all of the ingredients.

Making Yogurt from Cow's Milk

1000 ml of cow's milk is poured into a stainless container (fermentation machine) at a temperature of 40oC [9], then added a strain of lactic acid bacteria as much as 1 gram, homogenized and incrated for 8 hours [16]. Turn off the fermentation machine, then the yogurt is immediately put into a special bottle of shelter and ready to be packed.

Making Purple Sweet Potato's Yogurt

Purple yam yogurt probiotic drinks are made by packing yogurt and purple yam paste into one 100 ml bottle. The yogurt is put in a bottle, add the purple yam paste, and then homogenize. The composition is adjusted to the formulation on each bottle. The bottles are labeled P1, P2, P3 and P4. The comparison of composition is done by weighing yogurt and purple sweet potatoes paste in gram units. P1= 100 gram yogurt with no purple sweet potatoes paste (composition of yogurt and purple sweet potatoes paste 100:0). P2 = 50:50 yogurt and purple sweet potatoes paste composition (50g yogurt and 50g purple sweet potatoes paste). P3 = 70:30 yogurt and purple sweet potatoes paste composition (70g yogurt and 30g purple sweet potatoes paste). P4 = 80:20 ratio of yogurt to purple sweet potatoes paste (80g yogurt to 20g purple sweet potatoes paste). [17].

Hedonic Test

Panelists are given a hedonic test form and are instructed on how to complete the hedonic test form and the research technique. Following that, the panelists received purple yam yogurt with the bottle codes P1, P2, P3, and P4. Panelists complete the hedonic test form, which is in the form of a scale of assessment of taste, color, aroma, and texture with criteria. 1) very dislike, 2) dislike, 3) quite like 4) like 5) very like [13][15].

Data Analysis

Data from hedonic tests are presented in the form of assessment numbers on a predetermined scale. Then, using Excel, calculate the average value. The average calculation results are shown in a table format.

3. Results and discussion

The study included 33 panelists, 27 of whom were women and six of whom were men. Panelists aged 20 to 52 years were given probiotic drinks of P1, P2, P3, and P4 yogurt (table 1).

TABEL 1
DESCRIPTION OF PANELIST'S AGE

Age of Panelists	Gender
20-52 year old	Woman= 27 person, Man= 6 person

In table 2. displays the results of the preferred choice in P2 and P3, namely with the ratio between yogurt and purple sweet potatoes are 50:50 and 70:30. The resulting colors are purple and light purple (figure 1). The resulting purple color is from anthocyanins, the color content of purple sweet potatoes. The anthocyanin content found in purple sweet potatoes is higher compared to other yams. This purple sweet potato's yogurt looks attractive even though it does not have added synthetic dyes. The color content of anthocyanins contributes as an antioxidant. [10]. The amount of anthocyanin content can be seen from the concentrated color of purple sweet potatoes, which is consistent with the findings of Dan et al., 2013, who discovered that the amount of anthocyanin content in concentrated purple sweet potatoes can decrease by 34% when compared to the way they are boiled[18], fried, floured [19], and made chips with a percentage decrease in anthocyanin levels of 71.18%, 43.1%, 78.45%, and 95.21%, respectively, so the anthocyanin content that is considered to still have a greater content is in steamed purple yams. The decrease in levels occurs due to the presence of heat in the processing process [20].

When viewed in terms of concentrated color, the content of anthocyanins in P2 with a 50:50 ratio of yogurt and purple sweet potatoes is significantly higher than in P3 with a 70:30 ratio. The addition of purple sweet potatoes to yogurt ensures that panelists prefer purple sweet potato's yogurt over P1. It is distinguished by the fact that the average results of like ratings on P2 and P3 are higher than those on P1; and the assessment of hedonic tests on P4 has a higher average than that of P1. This is the only yogurt in P1 that does not contain purple sweet potatoes, so it lacks the purple color of anthocyanins.

TABLE 2
THE RESULT OF HEDONIC VALUE TO YOGURT PURPLE SWEET POTATO TOWARDS COLOR

Treatment Code	Ratio (gram) Yogurt : purple sweet potatoes	Color (mean)	Information
P1	100:0	3,6364	quite like -Like
P2	50:50	4,3030	Like
P3	70:30	4,3030	Like
P4	80:20	3,9697	quite like -Like



Figure. 1. Purple Sweet Potato Yoghurt Probiotic Drink
(Dokumen pribadi, 2021)

Table 3 shows the results of a hedonic test on the aroma of purple sweet potatoes yogurt. The aroma is caused by the presence of acetaldehyde, which is produced by lactic acid bacteria. The stronger the aroma of yogurt, the more finely tuned the acid. [21]. In comparison to P1, P2, and P4, P3 shows the preferred average rating. The preferred aroma is at P3, with a 70:30 ratio of yogurt and purple sweet potatoes. It has a stronger purple sweet potato's aroma in P2 than in P3. P4 has less purple sweet potato's aroma than P3 and more yogurt aroma. P4 is more dominant than P3. The Aroma of P4 is more dominant than the aroma of purple sweet potatoes, indicating that P4 has a higher lactic acid content than P2 and P3.

TABLE 3
THE RESULT OF HEDONIC VALUE TO YOGURT PURPLE SWEET POTATO TOWARDS FRAGRANCE

Treatment Code	Rasio (gram) Yogurt : purple sweet potatoes	Fragrance (mean)	Information
P1	100:0	3,5455	quite like -Like
P2	50:50	3,9394	quite like -Like
P3	70:30	4,1515	Like
P4	80:20	3,7576	quite like -Like

Table 4 shows that P3 has a better texture than P1, P2, and P4. The ratio of yogurt to purple sweet potatoes influences the texture. Strains of bacteria for yogurt can provide a thick texture because

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lactic acid bacteria produce mucus, which acts as a natural stabilizer [21]. The addition of water during the processing of purple sweet potato's paste ensures that the texture of purple sweet potatoes is smooth and soft. If you do not use water, the process of smoothing purple sweet potatoes will be difficult, and the paste will not form. P2 has a slightly diluted texture when compared to P1, P3, and P4, due to the fact that P2 contains more water than P1, P3, and P4. The composition of the water is a purple sweet potatoes paste made using 1:1 water with the amount of steamed yam added. The amount of purple sweet potatoes added to P2, P3 and P4 respectively is getting less and less, which is 50, 30 and 20grams. On P1, do not add purple sweet potatoes.

TABLE 4
THE RESULT OF HEDONIC VALUE TO YOGURT PURPLE SWEET POTATO TOWARDS TEXTURE

Treatment Code	Ratio (gram) Yogurt : Purple Sweet Potatoes	Texture (mean)	Information
P1	100:0	3,6061	quite like -Like
P2	50:50	3,8485	quite like -Like
P3	70:30	4,0303	Like
P4	80:20	3,9394	quite like -Like

Table 5 shows the hedonic test results versus taste, with P3 being the preferred result with a 70:30 ratio of yogurt and purple sweet potatoes. Yogurt has a higher protein content than purple sweet potatoes. According to the comparison, P3 has more acidic properties than P2, but fewer acids than P4, which has an 80:20 yogurt content. It is influenced by the amount of lactic acid bacteria present in yogurt, which produces acids such as lactic acid, diacety, 2-butanone, acetoin, and acetaldehyde. [22], As a result, P2 has a mildly sour taste and a sweet taste of purple sweet potatoes in a 50:50 ratio. P1 received the lowest taste rating because it contained only yogurt and no purple sweet potato's paste, which gives the most sour taste among P2, P3, and P4. Granulated sugar is purposefully added to purple sweet potato's paste to bring out the authenticity of the sour taste of yogurt.

TABLE 5
THE RESULT OF HEDONIC VALUE TO YOGURT PURPLE SWEET POTATO TOWARDS TASTE

Treatment Code	Ratio (gram) Yogurt : Purple Sweet Potatoes	Taste (Mean)	Information
P1	100:0	2,8788	Dislike- quite like
P2	50:50	3,9090	quite like -Like
P3	70:30	4,0303	like
P4	80:20	3,3636	quite like -Like

Table 6 displays the hedonic test results for overall appearance, indicating that it is visible in one assessment bottle of each bottle of P1, P2, P3, and P4. Color, aroma, texture, and taste are all evaluated in terms of their overall appearance. So, based on the overall appearance of the preferred, the assessment of purple sweet potato's yogurt is P3 with a rating of 4.2121. The color, aroma, texture, and taste of the ratio of yogurt to purple sweet potatoes 70:30 (P3) in one bottle with a yogurt composition of 70grams and purple sweet potatoes 30grams can be used as a variety of inputs in enjoying purple sweet potato's yogurt. The purple sweet potatoes content selected amounted to 30% of the composition of 100 ml, where the anthocyanin content is considered not too high in comparison to P2 and not too low in comparison to P4. This P3 has a preferred color because it is neither overly concentrated nor overly pale. The guarantee of purple sweet potato's yogurt is not based on the number of purple sweet potatoes, which are also thought to have a high anthocyanin content. However, the overall appearance of color, aroma, texture, and taste will determine the community's acceptance of purple sweet potato's yogurt. Acceptance of purple yam yogurt by the general public in P3 can be used as an alternative preferred choice and contributes as a probiotic drink because it contains lactic acid bacteria and has the antioxidant content of purple yam that panelists prefer.

TABLE 6
THE RESULT OF HEDONIC VALUE TO YOGURT PURPLE SWEET POTATO TOWARDS OVERALL APPEARANCE

Treatment Code	Rasio (gram) Yogurt: Purple Sweet Potatoes	Overall Appearance (mean)	Information
P1	100:0	3,4545	quite like -like
P2	50:50	4,0303	like
P3	70:30	4,2121	like
P4	80:20	3,8485	quite like

The hedonic test results are expected to be used to maintain endurance, particularly against covid-19, by paying attention to the taste, aroma, color, overall appearance and texture that people are interested in. At the time of the Covid-19 pandemic, yogurt could be a drink that plays an important role in preventing Covid-19 from becoming more severe. It can be seen that the bioactive activity of peptides from yogurt in prevention efforts is deteriorating, specifically with its role in inhibiting ACE and the potentialization effect of bradykinin, which demonstrates that it can make bioactive peptides effective against COVID-19 pathogenesis and harmful health consequences[4].

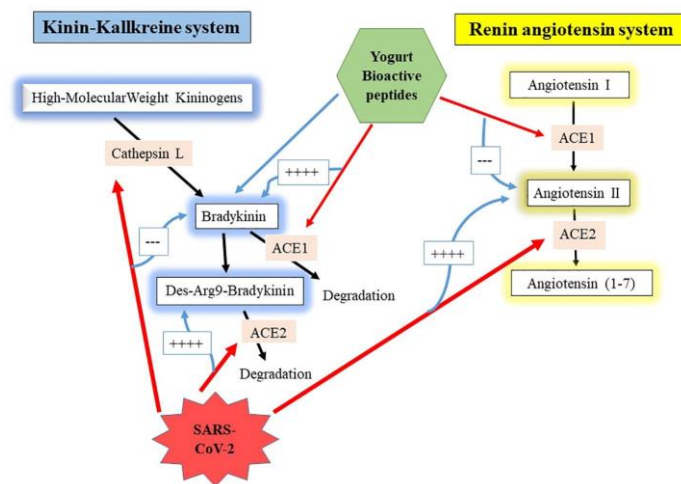


Figure 2: Beneficial activity of bioactive peptides found in yogurt.
The red arrow represents inhibition, while the blue arrow represents potentiation.

4. Conclusion

The results of the hedonic test of purple sweet potato's yogurt versus panelists' preferred color are P2 and P3, with the ratios of yogurt and purple sweet potatoes being 50:50 and 70:30, respectively. While the aroma, texture, taste, and overall appearance are described as P3, it is a probiotic drink of purple sweet potato's yogurt that panelists prefer over P1, P2, and P4.

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6. References

- [1] S. Cafarotti and U. Febts, "Sars-Cov2 Infection And Lung Cancer Patients: the potential role of IL17 target therapy," *J. Thorac. Oncol.*, 2020, doi: 10.1016/j.jtho.2020.04.015.
- [2] M. H. Bukhari, K. Mahmood, and S. A. Zahra, "Over view for the truth of COVID -19 pandemic: A guide for the Pathologists, Health care workers and community," *Pak J Med Sci*, vol. 36, pp. 111–114, 2020, doi: 10.5582/bst.2020.01047.
- [3] H. Mohseni *et al.*, "Are history of dietary intake and food habits of patients with clinical symptoms of COVID 19 different from healthy controls? A case-control study," *Clin. Nutr. ESPEN*, vol. 42, pp. 280–285, 2021, doi: 10.1016/j.clnesp.2021.01.021.
- [4] A. S. Gouda, F. G. Abdelruhman, H. Sabbah Alenezi, and B. Mégarbane, "Theoretical benefits of yogurt-derived bioactive peptides and probiotics in COVID-19 patients – A narrative review and hypotheses," *Saudi J. Biol. Sci.*, Jun. 2021, doi: 10.1016/j.sjbs.2021.06.046.
- [5] I. Thohari, T. E. Susilorini, A. E. Kusumastuti, and F. Jaya, "Diversification of Fermented Milk Product: Kefir and Yoghurt," *J. Innov. Appl. Technol.*, vol. 03, no. 02, pp. 459–465, 2017.
- [6] Y. Gou, "Structural characterization of a water-soluble purple sweet potato polysaccharide and its effect on intestinal inflammation in mice," *J. Funct. Foods*, vol. 61, 2019, doi: 10.1016/j.jff.2019.103502.
- [7] S. Yuliani, C. Winarti, N. Harimurti, Hernani, and K. T. Dewandar, *Bahan Pangan Potensial untuk Anti Virus dan Imun Booster*. 2020.
- [8] I. Sayuti, S. Wulandari, and D. K. Sari, "Penambahan Ekstrak Ubi Jalar Ungu (Ipomoea Batatas Var . Ayamurasaki) Dan Susu Skim

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- Terhadap Organoleptik Yoghurt Jagung Manis (*Zea mays* L . *Lactobacillus acidophilus* Dan *Bifidobacterium sp.*," *Pros. Semirata FMIPA Univ. Lampung*, no. 2011, pp. 399–410, 2013.
- [9] Rahma Novia Fadhilah, "Pengaruh Perbedaan Starter terhadap Karakteristik Yogurt Ubi Jalar Ungu (*Ipomea batatas* P)." pp. 19–22, 2018.
- [10] F. Devangga, B. Dwiloka, and ..., "Optimasi Persentase Penggunaan Tepung Ubi Jalar Ungu (*Ipomea batatas* L. Poir) pada Yoghurt Berdasarkan Parameter Aktivitas Antioksidan, Derajat Keasaman ...," *J. Teknol.* ..., vol. 3, no. 1, pp. 26–35, 2019, [Online]. Available: <https://ejournal3.undip.ac.id/index.php/tekpangan/article/view/21755>.
- [11] A. I. N. Tari, C. B. Handayani, and S. Hartati, "Sinbiotik Ekstrak Ubi Ungu dan Probiotik Lokal pada Yogurt: Kesehatan Pencernaan, Hematologi, dan Sistem Imun," *agriTECH*, vol. 40, no. 4. Universitas Gadjah Mada, p. 312, 2021, doi: 10.22146/agritech.29718.
- [12] K. Ratnasari, L. Levyda, and S. Bhudiarty, "Empowerment Of Business Development For Rumah Yogurt, Tebet, Jakarta Selatan," *ICCD*, vol. 2, no. 1. Universitas Prof. Dr. Moestopo Beragama, pp. 65–70, 2019, doi: 10.33068/iccd.vol2.iss1.237.
- [13] Z. Fanani and N. D. Kristanti, "Uji Kesukaan Kefir Susu Sapi Dengan Penambahan Tepung Kulit Pisang Kepok (*Musa Paradisiaca*) Test Result Of Cow Milk Kefir With The Addition Of Plantain Peel Flour (*Musa Paradisiaca*)," *J. Agriekstensi*, no. 2, pp. 157–161, 2012.
- [14] A. R. Karnopp, K. G. Oliveira, E. F. de Andrade, B. M. Postinger, and D. Granato, "Optimization of an organic yogurt based on sensorial, nutritional, and functional perspectives," *Food Chem.*, vol. 233, pp. 401–411, Oct. 2017, doi: 10.1016/J.FOODCHEM.2017.04.112.
- [15] L. P. Simanungkalit, S. Subekti, and A. S. Nurani, "Uji Penerimaan Produk Cookies Berbahan Dasar Tepung Ketan Hitam," *Media Pendidikan, Gizi, dan Kuliner*, vol. 7, no. 2, pp. 31–43, 2018.
- [16] A. I. N. Tari, C. B. Handayani, and S. Sudarmi, "Potensi Probiotik Indigenus *Lactobacillus Plantarum* Dad 13 Pada Yogurt Dengan Suplementasi Ekstrak Ubi Jalar Ungu Untuk Penurun Diare Dan Radikal Bebas," *Jurnal Agritech*, vol. 36, no. 1. Universitas Gadjah Mada, p. 7, 2016, doi: 10.22146/agritech.10677.
- [17] D. A. Kania, "Uji Kesukaan Es Krim Kefir Labu Kuning," *J. Ris. Kesehat.*, vol. 9, no. 1, pp. 16–22, 2017.
- [18] E. Ginting, J. S. Utomo, and R. Yulifanti, "Potensi Ubijalar Ungu sebagai Pangan Fungsional," *Iptek Tanam. Pangan*, vol. 6, no. 1, 2015.
- [19] A. Fitrianingrum and S. Tamaroh, "Pelarut Asam Tartarat Stability of Physical and Chemical Properties from Purple Yam With Tartaric Acid Solvent Abstrak," no. November, 2019.
- [20] S. Dan, P. Olahannya, N. El Husna, M. Novita, and S. Rohaya, "Kandungan Antosianin dan Aktivitas Antioksidan Ubi Jalar Ungu Segar dan Produk Olahannya," *J. Agritech*, vol. 33, no. 03, pp. 296–302, 2013, doi: 10.22146/agritech.9551.
- [21] M. Kroger, "Quality of Yogurt," *J. Dairy Sci.*, vol. 59, no. 2, pp. 344–350, 1976, doi: 10.3168/jds.S0022-0302(76)84208-7.
- [22] C. Chen, S. Zhao, G. Hao, H. Yu, H. Tian, and G. Zhao, "Role of lactic acid bacteria on the yogurt flavour: A review," *Int. J. Food Prop.*, vol. 20, no. 1, pp. S316–S330, 2017, doi: 10.1080/10942912.2017.1295988.