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The Effect of the Percentage of Non-Dairy Cream and Moringa Leaves Filtrate on the Chemical and Organoleptic Characteristics of Peanut Ice Cream

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Abstract. This research was conducted to determine the effect of the percentage of non-dairy cream and Moringa leaves filtrate on the characteristics of peanut ice cream. This research used a Completely Randomized Design (RAL) method with two factors i.e the percentage of non-dairy cream (10, 20%, 30%, and 40%) and the percentage of Moringa leaves filtrate (0%, 10%, 20%, and 30%) with three repetitions. The results showed that the percentage of non-dairy cream had a highly significant effect on fat and water content, total dissolved solids, overrun, melting time, and hedonic value of texture. The percentage of Moringa leaves filtrate had a highly significant effect on protein, fat, and water content vitamin C content, total dissolved solids, overrun, melting time, and hedonic value of taste. Interaction between the percentage of non-dairy cream and moringa leaves filtrate had a highly significant effect on fat content, total soluble solids, and overrun. Antioxidant analysis was conducted on the best treatment with a percentage of 40% non-dairy cream and 30% Moringa leaves filtrate with IC_{50} of 146.6368 ppm.

Keywords: ice cream, moringa leaves filtrate, non-dairy cream, peanuts

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1. Introduction

Peanut plants generally have even finned compound leaves and the stems have four leaf sheets [1]. Peanuts have a nutrition fat content of 45%, protein content of 27%, and other nutrient carbohydrates, calcium, phosphorus, iron, and vitamin B1 which are good for the body to consume [2]. Moringa leaves are often said to be superfoods because the nutrition of Moringa leaves is very good [3]. Moringa leaf plants have a very complete nutritional in the form of protein, carbohydrates, iron, calcium, vitamins consisting of vitamin A and vitamin C, and high potassium [4].

The increase in the consumption of ice cream in Indonesian society is 20% every year [5]. Ice cream is a food with a semi-solid texture which is generally made by mixing milk, animal fat or

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vegetable fat, and sugar with or without the addition of other ingredients then mixing and freezing. Ice cream is very popular for all ages because of its sweet taste and melt-in-the-mouth texture [6].

Non-dairy cream is a vegetable creamer made using vegetable oil that can be consumed by people with lactose intolerance [7]. The use of a small non-dairy cream will produce ice cream with a hard and rough texture of ice cream because the water content in the ice cream mixture is higher [8]. In addition, it needs to be added emulsifier to improve texture. One of the emulsifiers used in making ice cream is CMC. CMC is Carboxy Methyl Cellulose which has the function of preventing the formulation of large crystals in ice cream [9]. The use of CMC is conducted for a good food texture because CMC is related to textural properties such as consistency, thickness, gel strength, and elasticity [10]. Making peanut ice cream with the addition of Moringa leaves filtrate to increase the nutritional value of ice cream and the addition of non-dairy cream to a good texture of ice cream. In research [11] CMC is a stabilizer with many advantages, such as being easily soluble in hot and cold water, stable against fat, and affordable.

2. Materials and Methods

The materials used in this research were peanuts obtained from Pasar Pagi Simpang Limun, Jl. Kemiri, Medan, and Moringa leaves obtained from Bandar Tongah village, Bandar Huluan sub-district, Simalungun, sugar, CMC, and non-dairy cream obtained from Pasar Pondok Indah Jl. Setia Budi, Medan. The chemicals used pro analyst materials were aquadest, hexan solvent, 1% phenolphthalein, 0.1 N NaOH, 40% formaldehyde, 3% oxalic acid, ascorbic acid, HPO3, indophenol Na 2,6-dichlorophenol salt, sodium bicarbonate, ethanol, and DPPH.

2.1. Peanut Extract Production

Peanut extract is done by weighing 500 g of peanuts. Then washed and soaked for 10 hours with 1 liter of water. Then the peanuts were washed and boiled with 500 ml of water at 97 ºC for 5 minutes. After 5 minutes, the peanuts were drained in a stainless drain and the peanuts were mashed using a blender with the ratio of peanuts and water being 1:3 so that peanut extract was obtained.

2.2. Moringa Leaves Filtrate Production

Moringa leaves have been selected with the condition that the leaves are green and fresh. The selected Moringa leaves are washed under water, and then crushed using a blender with a ratio of Moringa leaves and water is 1:3. Then, it is filtered using a filter cloth that has been blanched to obtain Moringa leaves filtrate.

2.3. Peanut Extract Production

Peanut ice cream is made by mixing 200 ml of peanut extract, adding non-dairy cream (Max Creamer) with a percentage of 10%, 20%, 30%, and 40%, adding Moringa leaves filtrate with a

percentage of 0%, 10%, 20% and 30%, 15% sugar, 0.5% CMC and the ice cream mixture was pasteurized for 25 seconds at 80 ºC. Then, the mixture has cooled down to room temperature. Then homogenized using a hand mixer for 15 minutes. Then frozen for 4 hours at -20 ºC, mixed again for 15 minutes until it expands. The mixture is put in an ice cream cup and stored in the freezer until completely frozen.

2.4. Observation

Determination of Protein content formol titration method [12]. Fat content with the Soxhlet method [13]. Vitamin C content with levels oxidimetric method I [14]. Total dissolved solids content using a hand refractometer [15]. Moisture content with oven method [16]. Melting power [17]. Overrun [18]. Sensory (organoleptic) testing is based on a numerical scale [19] and antioxidant testing using the free radical method [20].

3. Results and Discussion

3.1. Protein Content

The percentage of Moringa leaves filtrate showed a highly significant different effect (P<0.01) in each treatment. The more the addition of moringa leaves filtrate, the higher the protein content of the resulting ice cream. The relationship between the percentage of moringa leaves filtrate and the protein content of peanut ice cream can be seen in Figure 1.

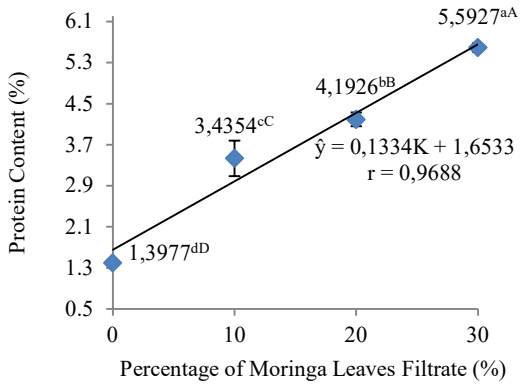

Figure 1. The Relationship between the Percentage of Moringa Leaves Filtrate and the Protein Content of Ice Cream Peanuts

Moringa leaves filtrate with a percentage of 0% produced a protein of 1.3977%. The percentage 10% of moringa leaves filtrate produced a protein of 3.4354%. The percentage 20% of moringa leaves filtrate produced a protein of 4.1926% and 30% of moringa leaves filtrate produced a protein of 5.5927%. Giving lots of Moringa leaves filtrate, the higher the protein content. Moringa leaves have high protein content [21]. The addition of Moringa leaves is directly proportional to the protein content. The more Moringa leaves are given, the higher the protein content will be [22]. The addition of 30% Moringa leaves provides a protein of 6,52 g. This difference is because the previous study used Moringa leaf powder and this study used Moringa leaf filtrate [23].

3.2. Fat Content

Interaction of the percentage of non-dairy cream and the percentage of moringa leaf filtrate showed a highly significant difference (P<0.01) from the fat content of the peanut ice cream produced. The interaction between the percentage of non-dairy cream and the percentage of moringa leaves filtrate on the fat content of peanut ice cream can be seen in Figure 2.

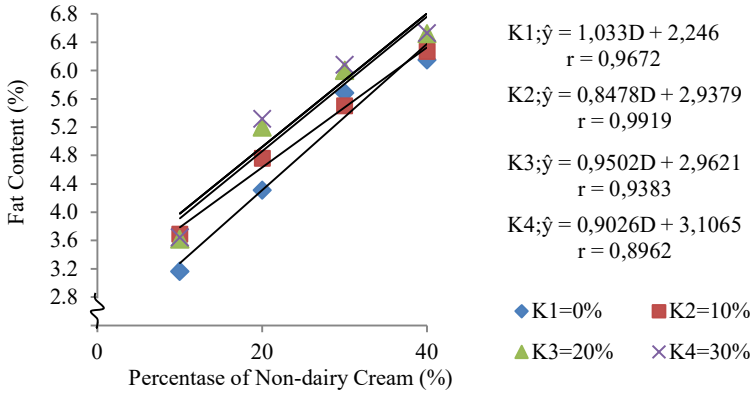

Figure 2. Interaction Relationship Between the Percentage of Non-Dairy Cream and the Percentage of Moringa Leaves Filtrate on the Fat Content of Peanut Ice Cream

The lowest fat content of peanut ice cream was in the D_1K_1 treatment at 3.1656% and the highest fat content of peanut ice cream was in the D_4K_4 treatment at 6.5322%. The more non-dairy cream added and the more moringa leaves filtrate added, the higher the fat content of the ice cream produced. Non-dairy cream has a high fat content of 6,6251%. The source of non-dairy cream fate comes from hydrogenated vegetable oil, so increasing o moringa leaves filtrate will have high-fat content [24]. The fat in commercial ice cream ranges from 4,4-7,06 g and the fat content is almost the same as commercial ice cream [25].

3.3. Vitamin C Content

The percentage of Moringa leaves filtrate had a highly significant (P<0.01) effect on the vitamin C content of the peanut ice cream produced. The addition of the percentage of moringa leaf filtrate can increase the levels of vitamin C in peanut ice cream. The relationship between the percentage of moringa leaves filtrate and the fat content of peanut ice cream can be seen in Figure 3.

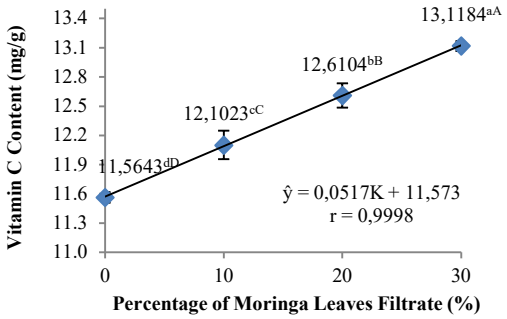

Figure 3. The Relationship Between the Percentage of Moringa Leaves Filtrate and the Level of Vitamin C in Peanut Ice Cream

The highest vitamin C content was found in the K_4 treatment, which was 13.1184 mg/g, and the lowest value was in the K_1 treatment, which was 11.5643 mg/g. The more addition of moringa leaves filtrate, the higher the level of vitamin C in the resulting peanut ice cream. Moringa leaves have high levels of vitamin C. Fresh old Moringa leaves have high levels of vitamin C, namely 17.3 mg/g. Using old moringa leaf increases vitamin C levels because more ascorbic acid accumulates [26]. In rolled pancakes, the addition of Moringa leaves filtrate increased vitamin C by 6,81 mg/100 g. so, in this research, the addition of Moringa leaf filtrates increased vitamin C [27].

3.4. Total Dissolved Solid Content

The interaction between the percentage of non-dairy cream and the percentage of Moringa leaves filtrate was highly significant ($P<0.01$) to the total dissolved solids of the peanut ice cream produced. The interaction between the percentage of non-dairy cream and the percentage of moringa leaves filtrate on the total dissolved solids of peanut ice cream can be seen in Figure 4.

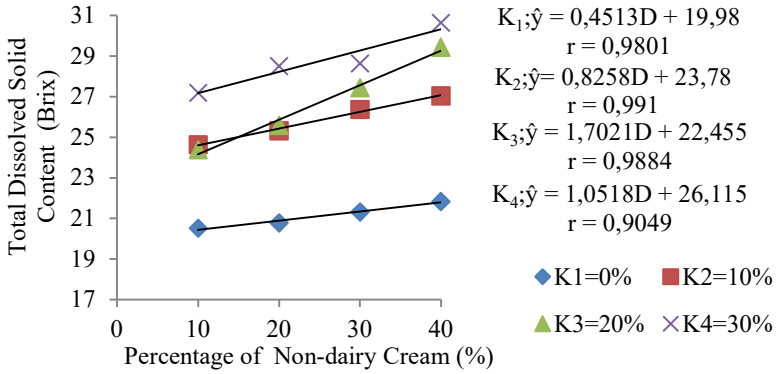

Figure 4. Interaction Relationship Between the Percentage of Non-Dairy Cream and the Percentage of Moringa Leaves Filtrate on the Total Dissolved Solids of Peanut Ice Cream

The lowest total dissolved solids value was found in the D_1K_1 treatment of 20.5184 ºBrix and the highest total dissolved solids value for peanut ice cream was in the D_4K_4 treatment of 30.6422 ºBrix. The total dissolved solids in ice cream are at least 3.4 [28] so the total dissolved solids value of peanut ice cream meets SNI. The addition of flour, vegetable creamer, sugar, emulsifiers, and stabilizers will increase the total dissolved solids and will make the dough thick because the amount of water in the dough will decrease [29]. Adding a lot of filtrates can reduce the total dissolved solid so that the ice cream becomes hard [37].

3.5. Water Content

The percentage of non-dairy cream had a highly significant ($P<0.01$) effect on the water content of the peanut ice cream produced. The relationship between the percentage of non-dairy cream and the water content of ice cream can be seen in Figure 5.

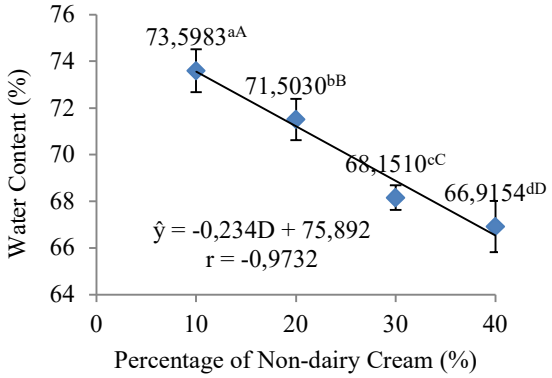

Figure 5. The Relationship of Non-Dairy Cream to the Water Content of Peanut Ice Cream

The percentage of non-dairy cream can reduce the water content of the peanut ice cream produced. The percentage of non-dairy cream 10% gave the highest water content of 73.5983% and the percentage of non-dairy cream 40% gave the lowest water content of 66.9154%. Decreasing the water content can increase the total solids because the dough becomes thick. An increase in total dissolved solids can reduce the water content in the material because free water has been bound. In making ice cream, a high water content will make the texture of the ice cream hard and rough, while a low water content will make the texture of the ice cream feel denser and softer [30].

The percentage of Moringa leaves filtrate had a highly significant (P<0.01) effect on the water content of the peanut ice cream produced. The relationship between the percentage of non-dairy cream and the water content of ice cream can be seen in Figure 6.

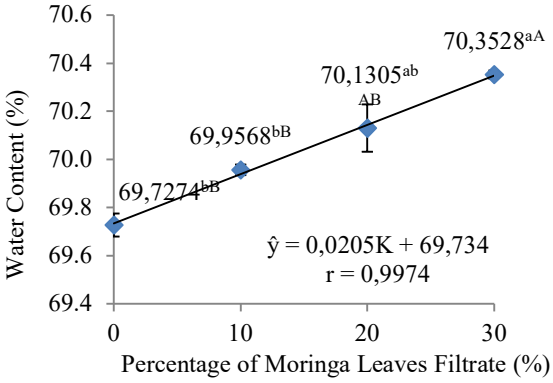

Figure 6. The Relationship Between Moringa Leaves Filtrate and the Water Content of Peanut Ice Cream

The increased percentage of Moringa leaves filtrate can increase the yield of water content in peanut ice cream. The lowest ice cream water content was in the K_1 treatment (0%) at 69.7274% and the highest water content was in the K_4 treatment (30%) which was 70.3528%. This happens because Moringa leaves have a high water content and Moringa leaves filtrate has a high water content due to the addition of 1:3 water in making Moringa leaves filtrate and fresh moringa leaves have a high moisture content because of the high water content in leaves [31].

3.6. Overrun

The interaction between the percentage of non-dairy cream and the percentage of Moringa leaves filtrate was highly significant (P<0.01) to the total dissolved solids of the peanut ice cream produced. The relationship between moringa leaves filtrate and peanut ice cream overrun can be seen in Figure 7.

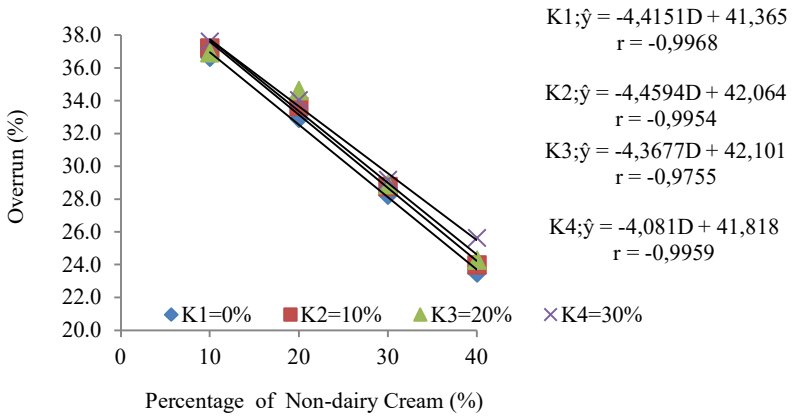

Figure 7. Interaction Relationship Between the Percentage of Non-Dairy Cream and the Percentage of Moringa Leaves Filtrate on Peanut Ice Cream Overrun

The lowest overrun value in peanut ice cream was the D_4K_1 treatment of 23.4858% and the highest overrun value in peanut ice cream was the D_1K_4 treatment of 37.6122%. Ice cream dough that is not thick will catch air more easily so that overrun increases. Low overrun has a high total solids and has a high melting time [32]. The more beetroot added will make the mixture thicker and the overrun decreases which is line with the addition of non-dairy cream to peanut ice cream [33].

3.7. Melting Time

The percentage of non-dairy cream had a highly significant (P<0.01) effect on the melting time of the peanut ice cream produced. The relationship between the percentage of non-dairy cream and the melting time of peanut ice cream can be seen in Figure 8.

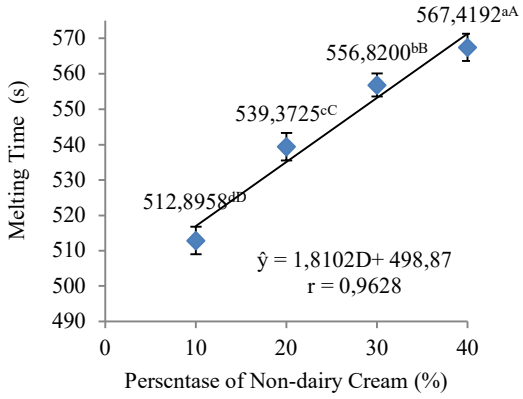

Figure 8. The Relationship Between the Percentage of Non-Diary Cream and the Melting Time of Peanut Ice Cream

The percentage of Moringa leaves filtrate had a highly significant (P<0.01) effect on the melting time of the resulting peanut ice cream. The relationship between the percentage of moringa leaves filtrate and the melting time of peanut ice cream can be seen in Figure 9.

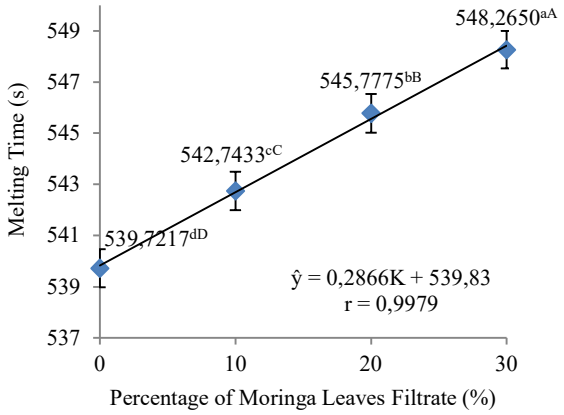

Figure 9. The Relationship Between the Percentage of Moringa Leaves Filtrate and the Melting Time of Peanut Ice Cream

The highest melting time was found in treatment K_4 (30%), namely 548.2650 seconds, and the lowest melting time for ice cream was in treatment K_1 (0%), namely 539.7217 seconds. In research [34] the melting speed of ice cream is directly proportional to the overrun value of the ice cream. The higher the overrun value of the ice cream, the easier the ice cream will melt. Non-dairy cream can bind water so using non-dairy cream will increase the melting time of the ice cream [35].

3.8. Hedonic of Taste

The percentage of Moringa leaves filtrate had a highly significant (P<0.01) effect on the hedonic taste of the resulting peanut ice cream. The relationship between the percentage of moringa leaves filtrate and the hedonic taste of peanut ice cream can be seen in Figure 10.

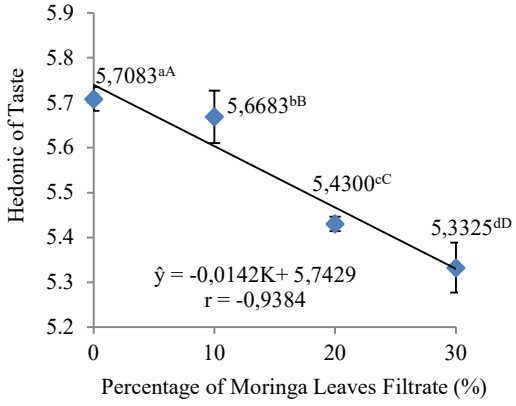

Figure 10. The Relationship Between the Percentage of Moringa Leaves Filtrate and the Hedonic Taste of Peanut Ice Cream

The hedonic value of ice cream has an interval between 5.3-5.7 which means like. the addition of moringa leaves filtrate lowers the hedonic value of taste. But the hedonic value of taste is still at a score of 5 it is means like. The addition of Moringa leaves will affect the taste produced because Moringa leaves have an unpleasant taste that comes from the lipooxidase enzyme that decomposes fat into odor-causing compounds and Moringa leaves have an astringent taste because of the tannin content in it [36].

3.9. Hedonic of Texture

The percentage of non-dairy cream had a highly significant (P<0.01) effect on the hedonic texture of the peanut ice cream produced. The relationship between the percentage of Moringa leaves filtrate and the hedonic texture of peanut ice cream can be seen in Figure 11.

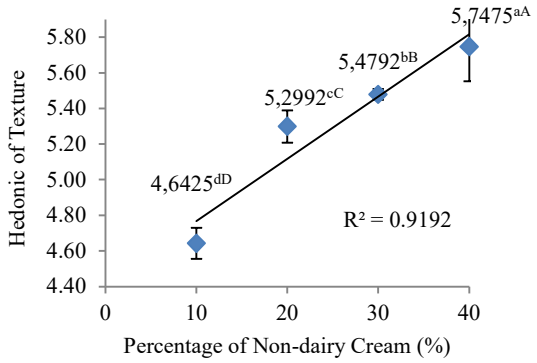

Figure 11. The Relationship Between the Percentage of Moringa Leaves Filtrate and the Hedonic Texture of Peanut Ice Cream

Hedonic texture ANOVA gives very significantly different results at P<0,01. The percentage of non-dairy cream increases the hedonic texture of ice cream which will make the ice cream dough thick and soft because non-dairy cream can give ice cream a soft texture. The softness factor in ice cream is the size of the ice cream crystals [37]. Vegetable creamer has the form of fine granules that dissolve easily which can form a softer gel texture and is preferred [24].

3.10. Best Treatment

Determination of the best treatment for peanut ice cream was carried out using the de Garmo effectiveness index test method by determining variable weights by ordering priority to parameters. In the antioxidant test, the result was that the IC_{50} value of peanut ice cream was 146.6368 ppm. It shows that the levels of antioxidants in peanut ice cream are moderate antioxidants which are supported by the literature [38] very strong antioxidants show an IC50 value of less than 50 ppm, strong antioxidants between 50-100 ppm, moderate antioxidants between 100-150 ppm and weak antioxidants between 150-200 ppm.

4. Conclusion and Recommendation

The percentage of non-dairy cream on peanut ice cream has a highly significant effect (P<0.01) on fat content (%), total dissolved solids (ºBrix), water content (%), overrun (%), melting time (seconds), and texture hedonic values. The percentage of moringa leaves filtrate to peanut ice cream had a highly significant (P<0.01) effect on protein content (%), fat content (%), vitamin C content (mg/g), total dissolved solids (ºBrix), moisture content (%), overrun (%), melting time (seconds), and the hedonic value of taste. The interaction between the percentage of non-dairy cream and the addition of moringa leaves filtrate of peanut ice cream had a highly significant effect (P<0.01) of fat content (%), total dissolved solids (ºBrix), and overrun. The best treatment for peanut ice cream is peanut ice cream with the addition of 40% non-dairy cream and the addition of 30% moringa leaves filtrate with the symbol D4K4. It is necessary to carry out further analysis regarding substitutes for milk fat which can form the texture of vegetable ice cream that resembles ice cream fat from an animal and it is necessary to carry out an analysis regarding the shelf life of ice cream on the physical and chemical qualities of ice cream.

REFERENCES

[1] R. Marzuki, Bertanam Kacang Tanah. Jakarta: Niaga Sadaya, 1987.

[2] R. D. andini and Ardisal, "Pengaruh pendekatan keterampilan proses terhadap keterampilan membuat makanan praline bagi anak tunarungu," *Jurnal Penelitian Pendidikan Kebutuhan Khusus*, vol. 6 no.1, pp. 243-249, 2018.

[3] F. G. Winarno, Tanaman Kelor (*Moringa oleifera*) Nilai Gizi, Manfaat, dan Potensi Utama. Jakarta: Gramedia, 2018.

[4] T. B. Rahayu, and Y. A. W. Nurindahsari, "Peningkatan status gizi balita melalui pemberian daun kelor (*Moringa oleifera*)," *Jurnal Kesehatan Madani Medika*, vol. 9, no. 2, pp. 87-91, 2018.

[5] Y. A. Nugroho, and J. Kusnadi, "Aplikasi kulit manggis (*Garcinia mangostana* L.) sebagai sumber antioksidan pada es krim," *Jurnal pangan dan Agroindustri*, vol. 3, no. 4, pp. 1263-1271, 2015.

[6] N. Hariyanti and A. Zuent, "Identifikasi mutu fisik,kimia dan organoleptik es krim daging kulit manggis (*Garcinia mangostana* L.) dengan variasi susu krim," *Jurnal Agritepa*, vol. 1 no. 2 pp. 143-156, 2015.

[7] F. Safitri, Yunianta, and I. Purwantiningrum, "Pengaruh penambahan pati termodifikasi pada non dairy creamer terhadap stabilitas emulsifikasi dan efisiensi sodium caseinate," *Jurnal Pangan dan Agroindustri*, vol. 1, no. 1, pp. 1-14, 2013.

[8] G. S. Darma, D. Puapitasari, and E. Noerhartati, "Pembuatan es krim jagung manis kajian jenis zat penstabil, konsentrasi *non dairy cream serta* aspek kelayakan financial," *Jurnal Reka Agroindustri*, vol. 1, no. 1, pp. 45-55, 2013.

[9] L. A. Y. Tumober, A. Yelnetty, R. Hadju, and G. D. G. Rembet, "Pengaruh persentase carboxy methyl cellulose (CMC) terhadap waktu leleh,pH, dan sifat sensori es krim probiotik," *Jurnal Zootech*, vol. 41, no 2, pp. 561-568, 2021.

[10] A. S. Y. Wea, R. Widodo, and Y. A. Pratomo, "Evaluasi kualitas produk susu kecambah kacang hijau, kajian dari umur kecambah dan konsentrasi Na-CMC," *Jurnal Teknik Industri Heuristic*, vol. 11, no. 1, pp. 61-79, 2014.

[11] D. Hasni, Irfan, and R. Saputri, "Pengaruh Formulasi bahan baku CMC (Carboxy Methyl Cellulose) terhadap mutu dan penerimaan konsumen susu nabati", *Jurnal Teknologi danIndustri Pertanian Indonesia*, vol. 13. No. 2, pp. 78-85, 2021.

[12] S. Sudarmadji, B. Haryono, and Suhardi, Prosedur Analisa Untuk Bahan Makanan dan Pertanian. Yogyakarta: Liberty, 1984.

[13] Association of Official Analytical Chemist, Official Methods of Analysis: 18th Edition, Washington DC: AOAC Publisher, 2005.

[14] N. Apriyantono, D. Fardiaz, N. L. Puspitasari, Sedarnawati, and S. Budiyanto, Analisis Pangan: Petunjuk Laboratorium, Bogor: IPB Press, 1989.

[15] T. R. Muchtadi and Sugiono, Ilmu Pengetahuan Bahan Pangan, Bogor: IPB-Press, 1990.

[16] Hafiludin, "Karakteristik proksimat dan kandungan senyawa kimiadaging putih dan daging merah ikan tongkol (*Euthymnus affinis*)," *Jurnal Kelautan*, vol. 4, no. 1, pp. 1-10, 2011.

[17] W. Tamimi, Nurwantoro, and V. P. Bintoro, "Karakteristik gelato susu kambing dengan penambahan ekstrak daun pegagan," *Jurnal Teknologi Pangan*, vol. 3, no.1, pp. 51-62, 2018.

[18] C. Zahro and F. C. Nisa, "Pengaruh penambahan sari anggur (*Vitis vinifera L.*) dan penstabil terhadap karakteristik fisik, kimia, dan organoleptik es krim," *Jurnal Pangan dan Agroindustri*, vol. 3, no. 4, pp. 1481-1491, 2015.

[19] S. T. Soekarto, Penilaian Organoleptik untuk Industri Pangan dan Hasil Pertanian, Jakarta: Bhrata Karya Aksara, 1985.

[20] L. F. Frindryani, "Isolasi dan uji aktivitas senyawa antioksidan senyyawa dalam ekstrak etanol temu kunci (*Boesenbergia pandurata*) dengan metode DPPH," Departemant of Mathematic, Faculty of Mathematics and Natural Science, Universitas Negeri Yogyakarta, 2016.

[21] Y. Friskilla and Rahmawati, "Pengembangan minuman teh hitam dengan daun kelor (*Moringa oleifera* L) sebagai minuman menyegarkan," *Jurnal Industri Kreatif dan Kewirausahaan*, vol. 1, no. 1, pp. 23-32, 2018.

[22] D. P. Dewi, "Substitusi tepung daun kelor (*Moringa oleifera* L.) pada cookied terhadap sifat fisik, sifat organoleptk, kadar proksimat, dan kadar Fe," *Jurnal Ilmu Gizi Indonesia,* vol. 1, no. 2, pp. 104-112, 2018.

[23] A. B. Iskandar, F. W. Ningtyias, and N. Rohmawati, "Analisis kadar protein, kalsium dan daya terima es krim dengan penambahan tepung daun kelor (moringa oleifera)" *Jurnal Penel Gizi Makan*, vol 42, no. 2, pp. 65-72, 2019.

[24] P. P. Marbun, H. Rusmarilin, and E. Julianti, "Pengaruh penambahan tepung kuning telur dan krimer nabati terhadap mutu tepung pudding instan," *Jurnal Rekayasa Pangan dan Pertanian*, vol. 6, no. 3, pp. 498-509, 2018.

[25] I. M. B. Ilmi, F. A. Arini, A. Q. Marjan, and S. F. N. Habieb, "Kandungan gula es krim yang disukai mahasiswa depok", *Journal of The Indonesian Nutrition Association*, vol. 46, no. 2, pp. 221-228, 2023.

[26] S. Kadir, Rostiati, and E. Mardiana, "Minuman instan daun kelor (*Moringa oleifera* Lam.) dari berbagai umur panen," *Jurnal Agrotekbis*, vol. 9, no. 6, pp. 1473-1482, 2021.

[27] S. L. Maharani, N. Rohmawati, and M. N. Hidayati, "Pengaruh Penambahan Sari Daun Kelor terhadap Kadar Zat Besi, Vitamin C dan Daya Terima Kue Dadar Gulung", *Jurnal Nutrisia*, Vol. 23, No. 2, pp. 86 – 93, 2021.

[28] Badan Standarisasi Nasional, Standar Nasional Indonesia (SNI 01-3830-1995). Syarat Mutu Susu Kedelai. Jakarta: Dewan Standarisasi Nasional, 1995.

[29] I. A. Wijayanti, Purwadi, and I. Thohari, "Pengaruh penambahan tepung sagu pada *yoghurt* terhadap viskositas, *overrun*, kecepatan meleleh dan total padatan pada es krim yoghurt," *Jurnal Ilmu dan Teknologi Hasil Ternak*, vol. 10, no. 2, pp. 28-35, 2015.

[30] R. Nofrida, Y. Sulastri, R. Widyasari, M. A. Zaini, and A. Nasrullah, "Pengaruh penambahan stabilizer alami berbasis umbi lokal untuk peningkatan sifat fisik dan kimia es krim buah naga merah (*Hylocereus polyrhizus* SP)," *Jurnal Ilmiah Teknologi Pertanian*, vol. 3, no. 1, pp. 298-306, 2018.

[31] S. Anwar, E. Yulianti, A. Hakim, A. G. Fasya, B. Fauziyah, and R. Mut'iah, "Uji toksisitas esktrak akuades (suhu kamar) dan akuades panas (70 ºC) daun kelor (*Moringa oleifera* Lamk.) terhadap larva udang *Artemia salina* Leach," *Jurnal Alchemy*, vol. 3, no. 1, pp. 84-92, 2014.

[32] W. Tamimi, Nurwantoro, and V. P. Bintoro, "Karakteristik gelato susu kambing dengan penambahan ekstrak daun pegagan," *Jurnal Teknologi Pangan*, vol. 3, no. 1, pp. 51-62, 2018.

[33] N. S. Achyadi, Hervelly, and H. Respiani, "Perbandingan sari kacang kedelai dengan bubur umbi bit dan konsentrasi santan terhadap karakteristik es krim nabari", *Jurnal Pasundan Food Teknologi*, vol. 7, no. 2, pp. 57-64, 2020.

[34] K. Istiqomah, W. S. Windrati, and Y. Praptiningsih, "Karakteristik es krim edamame dengan variasi jenis dan jumlah penstabil," *Jurnal Agroteknologi*, vol. 11, no. 2, pp. 139-147, 2017.

[35] N. S. Achyadi, Hervelly, and H. Respiani, "Perbandingan sari kacang kedelai dengan bubur umbi bit dan konsentrasi santan terhadap karakteristik es krim nabari", *Jurnal Pasundan Food Teknologi*, vol. 7, no. 2, pp. 57-64, 2020.

[36] A. D. Ilona and R. Ismawati, "Pengaruh penambahan ekstrak daun kelor (*Moringa β*) dan waktu inkubasi terhadap sifat organoleptik yoghurt," *Jurnal Boga*, vol. 4, no. 3, pp. 151-159, 2015.

[37] C. Lamere, S. E. Siswisubroto, R. Hadju, and M. Tamasoleng, "Pengaruh substitusi gula pasir dengan ekstrak jagung manis (*Zea mays l sacchara*) terhadap organoleptik es krim," *Jurnal Zootech*, vol. 41, no. 1, pp. 89-96, 2021.

[38] R. Niah, and R. N. Baharsyah, "Uji aktivitas antioksidan esktrak etanol kulit buah naga merah super (*Hyclocereus costaricenci*)," *Jurnal Pharmascience*, vol. 5, no. 1, pp. 14-21, 2018.