ALKIMIA : Jurnal Ilmu Kimia dan Terapan

ARTICLES

View Article Online
View Journal | View Issue

OPEN ACCESS

Innovation of Avocado Leaf-Based Jelly Candy with the Addition of Beef Gelatin

Sulung Rahmawan Wira Ghani[a]*, Elly Rustanti[b]

Abstract. This study aims to develop avocado (*Persea americana* Mill) leaf-based jelly candy with the addition of bovine gelatin, in response to the increasing demand for herbal food and beverage products in Indonesia. The research methodology involved making five jelly candy formulas with varying concentrations of gelatin and avocado leaf extract. Product quality testing was conducted to determine moisture content, pH, texture, and organoleptic analysis. The results showed that all jelly candy formulas met the set standards for moisture content, with a pH that was classified as acidic and ranged from 3.35 to 4.56. The texture of the jelly increased with increasing gelatin concentration, and formula 5 obtained the highest score in the organoleptic test, indicating panelists' preference for color, aroma, taste, and texture. The conclusion of this study is that the formulation of bovine gelatin addition has a significant effect on the quality of jelly candy, with formula 5 being the most preferred. This research provides an important contribution to the development of herbal products in the food and beverage industry in the form of jelly candy products.

Keywords : Cotton, extraction, Lattice Parameter, Le Bail's Method, refinement

[a]*Universitas Hasyim Asy'ari Tebuireng, Jombang, Jawa Timur 61471, Indonesia.*
[b]*STIKes Husada Jombang, Jawa Timur 61481, Indonesia.*
Correspondence and requests for materials should be addressed to Sulung Rahmawan Wira Ghani (email: sulungghani@unhasy.ac.id).

Introduction

The development of the herbal food and beverage industry in Indonesia shows an increasingly positive trend, in line with the growing awareness of the importance of healthy food consumption. Indonesia, as a country rich in genetic resources, has a variety of herbal plants that can be utilized to create innovative products. One such herbal plant that can be transformed into an innovative product is the avocado plant. Avocado (*Persea americana* Mill), which belongs to the Lauraceae family, thrives in tropical and subtropical regions. This plant is one of the important medicinal plants and is used in traditional medicine for treatment. Chemical analysis of this plant has isolated several compounds, including saponins, alkaloids, flavonoids, terpenes, safrole, and tannins. Some of these avocado leaf compounds serve as sources of antioxidants. Recently, the food, pharmaceutical, and cosmetics industries have shown interest in seeking new sources of natural antioxidants as alternatives to synthetic ones. The use of synthetic antioxidants is often associated with toxic effects and the promotion of carcinogenesis (Ito et al., 1983). This fact underscores the need to develop food products based on avocado leaves that appeal to many people, not only as traditional medicine but also as specific food products enhanced with other ingredients to improve flavor and visual appeal for consumers. One practical alternative product that can be developed from avocado leaves is jelly candy with the addition of beef gelatin as a gelling agent.

Jelly candy is a soft-textured product made from a mixture of fats, gelatin, emulsifiers, and certain ingredients, resulting in a product that is firm enough to shape but soft enough to chew. Key parameters determining the quality of jelly candy include gel strength, viscosity, attractive color, and texture. Gel strength is influenced by pH, gelatin, and other additives. The gel strength formed in jelly candy products is affected by the type of gelatin added. According to Maryani et al. (2020), beef gelatin exhibits higher gel strength (3.22 N) compared to fish gelatin (1.81 N). The use of beef gelatin as a gelling agent in the production of jelly or candy provides opportunities to develop more varied and appealing products. The results of this research are expected to offer benefits and new innovations in utilizing avocado leaves as a source of natural antioxidants in the form of quality jelly candy products, which can later be developed on an industrial scale.

Experimental

The sample used in this study was avocado leaf extract (*Persea Americana* Mill). The research procedure used is experimental laboratories. Making jelly candy with glatin from cow bone. Formulations were made as shown in Table 1.

Preparation of jelly candy. The production of jelly candy begins by dissolving sucrose and HFS in hot water. Next, the beef gelatin, which acts as the gelling agent, is added and stirred until the mixture thickens. Then, avocado leaf extract and citric acid are incorporated. The mixture is then poured into square molds and allowed to sit until it reaches room temperature. After that, the product is placed in the refrigerator. Finally, the product is removed from the molds and cut into squares.

Quality Test Of Avocado Leaf Jelly Candy

Moisture content testing. The porcelain dish is dried in an oven at 105°C for 1 hour. The dish is then cooled in a desiccator for 15 minutes and weighed until a constant weight is achieved. A sample of 5 g is placed in the dish and then dried in the oven at 105°C for 5 hours or until a constant weight is reached. The dish is then cooled in the desiccator and weighed again.

PH testing. Before use, the pH meter electrode is standardized using buffer solutions of pH 4 and pH 7, then cleaned with distilled water and dried. A sample of 1 g of jelly candy is weighed, crushed, and mixed with 5 mL of distilled water. The

Table 1. Jelly candy product formula

Material	F1	F2	F3	F4	F5
Gelatin	9%	10%	11%	12%	13%
Sucrose	45,8%	45,8%	45,8%	45,8%	45,8%
Avocado leaf extract	5%	8%	10%	13%	15%
HFS	40%	40%	40%	40%	40%
Asam sitrat	0,2%	0,2%	0,2%	0,2%	0,2%

electrode is then immersed in the sample and allowed to stabilize until a consistent reading is obtained. The pH meter reading is recorded.

Texture. Samples are prepared with a thickness of 2 cm. put in a container on the tool used. Then measure the texture with a cashew penetro tool. The data obtained is recorded in newton units.

Organoleptic test. A total of 10 panelists responded to the jelly candy product on aroma, taste, color, and texture.

Data analysis. Data on the quality of jelly candy using bovine gelatin was analyzed by one way anova using spss to test the effect of differences in the addition of bovine gelatin on the quality

of jelly products. Non-parametric data analysis was used to analyze data generated from hedonic tests. The non-parametric data analysis used was KruskalWallis.

Result and Discussion

The material used in the process of making jelly candy is avocado leaf extract as a natural flavor and color forming ingredient in jelly candy. The principle of semi-wet food processing is to reduce the water content to a certain level so that pathogenic microbes cannot grow, the recommended water content is around 20-40%. In this study avocado leaf candy was made with a mixture of avocado leaf extract, sugar, glatin and water. This jelly candy product quality analysis aims to determine the quality of the jelly candy product produced so that it is believed to be safe when consumed by consumers. This analysis includes water content, acidity (pH), texture.

Water content. Based on the data of the test results of water content in jelly candy presented in **Table 2** shows that the addition of gelatin gives an influence on the water content of jelly candy on different types of gelatin. Referring to the standard water content of jelly confectionery according to SNI 01-3547-1994 at a maximum of 20%, then all the water content of jelly candy meets the standard. gelatin is able to absorb water in the material and is a colloidal dispersion system that can easily absorb large amounts of water. Gelatin will help bind large amounts of water and form a network that will inhibit the movement of water.

Based on the results of the ANOVA analysis test, the resulting F-Count value is 0.109, while the F - Table value is 3.48. This indicates that the formulation of various concentrations of gelatin added has no effect on the moisture content of jelly candy. Thus, the formulation of gelatin concentration can be considered without affecting the moisture content of the product.

Based on the pH test data on jelly candy presented in the **Table 2**, the pH value produced by all treatments is classified as acidic because the pH value is below 7 (neutral). The pH value is related to the gel strength value of jelly candy. The pH value of jelly candy experienced a less stable increase, especially in jelly candy formulas 3 and 4. The lowest pH is known in jelly candy product formula 3 with a value of 3.35 and the highest is known in formula 5 at 4.56. These results are in accordance with Indonesian standards regarding the quality of jelly candy (SNI 3547-2-2008) the pH of jelly candy is in the range of 4.5-6.5.

Based on the ANOVA analysis test results, the F-Count value generated was 24.13, while the F-Table value was 3.48. This shows that the formulation of various concentrations of gelatin added can affect the acidity (pH) of the jelly candy produced. Thus, variation in gelatin concentration is an important factor in the formulation to achieve the desired pH in the product. Meanwhile, **Table 2** shows that the texture of jelly candy increases as the concentration of gelatin added increases, except for product 4. The smallest average texture is found in jelly candy formula 4 of 1.3 and the highest texture

Table 2. Water content, pH, and texture value of jelly candy

Formula of jelly candy	Water content (%)	pH	Texture (N)
F1	43,77	4,33	1,5
F2	45,43	4,35	1,8
F3	43,71	3,35	2,2
F4	41,13	3,53	1,3
F5	46,18	4,56	3,1

in jelly candy formula 5 of 3.1 Newton.

Based on the ANOVA test results, the resulting F-Count value is 6.10, while the F-Table value is 3.48. Thus, the formulation of gelatin concentration variation added plays an important role in determining the texture (chewiness) of the jelly candy produced. Variations in gelatin concentration should be considered in the formulation to achieve the desired texture in the product.

Color. Based on the organoleptic test results in **Table 3**. It is known that the level of panelist preference for product color generally likes the F5 jelly candy product with the highest score of 4.0. Which shows that the product has a brown and attractive color. Kruskal-Wallish analysis with an asym significant value of 0.000 < α 0.05 which shows the effect of the addition of bovine gelatin on panelist assessment in jelly candy products.

Table 3. Organoleptic test results of jelly candy

Formula of jelly candy	Specs			
	color	Aroma	Taste	texture
F1	1,2	1,6	2,9	2,2
F2	1,4	1,7	3,1	2,9
F3	3,0	2,3	3,2	3,7
F4	3,4	2,8	2,9	4
F5	4.0	3	2,9	4

Aroma. The jelly candy product formula most favored by panelists is formula 5 with the highest score of 3 which indicates that the jelly candy product does not smell. The results of kruskal-wallish analysis on the aroma of jelly candy obtained an asymp significant value of 0.001 < α 0.05, thus indicating that there is an effect of gelatin addition on the panelists' response in jelly candy products.

Taste. The jelly candy product formula that is most liked by panelists is formula 4 &5 with an average score of 4 which shows that jelly candy products have a sweet taste like jelly candy in general. The results of kruskal-wallish analysis on the texture of jelly candy obtained an asymp significant value of 0.710> α 0.05, thus indicating that there is no effect of the addition of gelatin on the panelists' response in jelly candy products. It is suspected that the amount of sucrose and fructose syrup used in the manufacture of jelly candy products is enough to give sweetness to the product, so it does not affect the taste when adding gelatin in increasingly large concentrations.

Texture. The jelly candy product formulas most favored by panelists are formulas 4 and 5 with an average score of 4 which indicates that the jelly candy product has a chewy texture and is not watery. The results of kruskal-wallish analysis on the texture of jelly candy obtained an asynp significant value of 0.000 < α 0.05, thus indicating that there is an effect of the addition of gelatin on the panelists' response in the product.

CONCLUSION

The conclusion obtained from this research is that the application of design and development of Indonesian herbal industry products is important to be developed, through formulation experiments the addition of bovine gelatin gives significant results in testing water content, pH, texture, and organoleptic tests. The best jelly candy formula based on product quality analysis is formula 5. Based on the organoleptic test, formula 5 is preferred by panelists because it has an attractive aroma and sweet taste, tempting brown color, and chewy texture.

References

[1] Aditya, M. A. (2019). Pengaruh variasi konsentrasi ekstrak daun Afrika (Vernonia amygdalina) terhadap karakteristik organoleptik hard candy (Doctoral dissertation, Fakultas Teknik Unpas).

[2] Ali, M. N. (2022). Uji daya terima pancake alpukat (Persea americana Mill) sebagai alternatif produk makanan tambahan ibu menyusui 0-6 bulan (Doctoral dissertation, Universitas Hasanuddin).

[3] Andriani, D. P., Fikri, A. K., & Nur'aini, S. D. (2018). Analisis pengendalian kualitas persentase kadar air produk wafer stick pada industri makanan ringan. Industri Inovatif: Jurnal Teknik Industri, 8(2), 10-17.

[4] Arwanda, S. N., Wibisono, W., & Sari, R. P. (2021). Efektivitas daun alpukat untuk kesehatan. Nusantara Hasana Journal, 1(2), 40-45.

[5] Arza, P. A., & Sari, S. P. (2018). Pengaruh penambahan ekstrak daun alpukat (Persea americana, Mill) terhadap mutu organoleptik dan kadar kalium puding pisang. Jurnal Pendidikan dan Keluarga, 9 (2), 58.

[6] Asyifyan, M. A., & Sujianto, A. E. (2019). Pelatihan generasi millennials melalui transformasi daun alpukat menjadi minuman menyehatkan dan menyegarkan. Jurnal Abdi Masyarakat, 2(2).

[7] Fitriana, R., Kurniawan, W., & Siregar, J. G. (2020). Pengendalian kualitas pangan dengan penerapan good manufacturing practices (GMP) pada proses produksi dodol Betawi (Studi Kasus UKM MC). Jurnal Teknologi Industri Pertanian, 30(1).

[8] Gusnita, W., Holinesti, R., Zulfikar, D., Kasmita, K., & Insan, R. R. (2021). Pelatihan pengolahan aneka kudapan berbahan baku pangan lokal (Alpukat) sebagai upaya peningkatan ekonomi keluarga di Nagari Padang Laweh Malalo Kecamatan Batipuh Selatan Kabupaten Tanah Datar. LOGISTA: Jurnal Ilmiah Pengabdian kepada Masyarakat, 5 (1), 102-109.

[9] Humaira, A., & Haryani, S. (2022). Kajian literatur pembuatan avocado fruit butter (Margarin Buah Alpukat). Jurnal Ilmiah Mahasiswa Pertanian, 7(3), 257-263.

[10] Kamri, A. M. (2022). Produksi permen kurma-asam jawa untuk penderita diabetes mellitus type-2 pada ibu rumah tangga non produktif di Kecamatan Manggala, Kelurahan Antang, Makassar. Jurnal Dinamika Pengabdian, 8(1), 191-199.

[11] Mooduto, I. P. U., Liputo, S. A., & Antuli, Z. (2022). Analisis fisiko-kimia dan organoleptik mayonnaise berbahan dasar buah alpukat (Persea americana). Jambura Journal of Food Technology, 4(1), 100-110.

[12] Muizz, M. R. (2019). Pembuatan permen jelly dengan variasi konsentrasi sari buah bit dan buah jambu biji terhadap penambahan gelatin (Doctoral dissertation, Politeknik Negeri Sriwijaya).

[13] Putih, P. P. U. J., & Biji, P. (2020). Alpukat (Persea americana Mill) sebagai edible film pada produk pangan. Jurnal Sains dan Aplikasi, 8(2).

[14] Rosida, D. F., & Taqwa, A. A. (2019). Kajian pengembangan produk salak senase (Salacca zalacca (Gaert.) Voss) Bangkalan Madura sebagai permen jelly. Jurnal Agroteknologi, 13(01), 62-74.

[15] Salomon, L. L., Kosasih, W., & Sukania, I. W. (2019). Pendampingan pengembangan produk baru pada industri kecil menengah produk makanan ringan guna peningkatan daya saing. Jurnal Bakti Masyarakat Indonesia, 2 (2), 131-140.

[16] Sutiyarno, D., & Chriswahyudi, C. (2019). Analisis pengendalian kualitas dan pengembangan produk wafer Osuka dengan metode Six Sigma konsep DMAIC dan metode Quality Function Deployment di PT. Indosari Mandiri. JIEMS (Journal of Industrial Engineering and Management Systems), 12(1).

[17] Winarno, P. S., Imawan, M. A., & Dewi, I. C. (2022). Analisis strategi marketing dan penerimaan pasar pada produk biji alpukat "Alpukatuil". Jurnal Ilmiah Manajemen, Ekonomi, & Akuntansi (MEA), 6(3), 240-252.

[18] Winarti, S. (2021). Pengembangan produk cookies gluten free ber-basis umbi-umbian lokal di UD. Sofia Cookies. ABIYASA, 1(1), 1-6.

[19] Wulandari, E. F. (2020). Kuya: Permen herbal kombinasi kunyit, daun pepaya dan asam jawa sebagai antioksidan untuk meningkatkan imunitas tubuh.

[20] Warsito, H. (2022). Studi pembuatan permen marshmallow jambu biji merah sebagai makanan selingan untuk pencegahan penyakit degeneratif. HARENA: Jurnal Gizi, 2(3), 114-124.