



Research Article

The Effect Of Adding Centella Asiatica L. Urban Leaves on the Moisture Content And Acceptability Of Centella Asiatica Sticks

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ABSTRACT

Pegagan (*Centella Asiatica L. Urban*) is a plant that belongs to the Umbelliferae or Apiaceae tribe. It is an herbal plant that grows on the ground, with a wide distribution area, especially in the tropics and subtropics. Currently, there is a scarcity of innovations for healthy and nutritious sticks, making it essential to explore new avenues in product development. Sticks are widely popular among people of all ages, from teenagers to adults. This study aims to analyze the moisture content and acceptability of gotu kola leaves sticks. The study employs a Completely Randomized Design (RAL) with one control and three treatments, namely 4%, 6% and 8%. Organoleptic tests and water content tests were conducted on June 15, 2022, at the Chemical Laboratory of the Karya Husada Nutrition Academy, Kediri, Indonesia. The study results revealed a significance level of <0.05 , indicating no difference in the acceptability of the color, aroma, texture and taste of pegagan leaves sticks. In the color acceptability test, 100% of panelists most favored sticks P1 and P2., in the aroma stick acceptance test the panelists most liked sticks P1 and P2 by 100%, For stick texture acceptance, 100% of panelists favored sticks P2., In the stickiness test, the preferred sticks were P1 by 100%. The lowest water content, with the addition of pegagan leaves, was found in treatment 1 with a 4% addition of pegagan leaves at 2.63%. further research is needed to explore the antioxidant content and the expiration of pegagan sticks.

Keywords: Acceptability, pegagan sticks, pegagan leaves, water content

INTRODUCTION

In today's modern era, Indonesia tends to adopt an instant lifestyle. Poor food consumption patterns and a lack of physical activity can lead to health problems, including non-communicable diseases caused by free radicals. The World Health Organization (WHO) states that 70% of deaths worldwide are caused by non-communicable diseases (WHO, 2019). In Indonesia, according to the 2018 Riskesdas data, the prevalence of non-communicable diseases has increased compared to the 2013 Riskesdas data. The prevalence of cancer rose from 1.4% to 1.8%, stroke from 7% to 10.9%, diabetes mellitus from 6.9% to 8.5% and hypertension from 25.8% to 34.1% (Kemenkes RI, 2018).



Efforts to prevent the accumulation of free radicals, which can lead to the development of non-communicable diseases, require antioxidant compounds. These compounds reduce and inhibit the formation of new free radicals in the body by acting as electrons donors. This process helps pair free electrons in free radicals, preventing damage in the body (Rao, et al., 2011).

Gotu kola (*Centella Asiatica* L. Urban) is an herbal plant that creeps on the ground and has a wide distribution, especially in tropical and subtropical areas. Research (Rahman, et al., 2013) indicates that gotu kola leaves contain polyphenols, flavonoids, β carotene, potassium, sodium, calcium, iron, phosphorus and B vitamins. Another study found that gotu kola contains chemical substances, including asiaticosidase, which is a part of saponins (Orhan, 2012).

The utilization of gotu kola is still very rare in Indonesia. Gotu kola leaves are known as wild plants that are easily found in gardens and yards, often being left alone or eliminated because they are considered plant pests. However, numerous studies suggest that gotu kola leaves have various health benefits.

Therefore, there is a need to find ways to utilize gotu kola leaves, which are rich in antioxidants, to enhance the nutritional content of processed foods such as sticks. Stik is a long, flat snack made from wheat flour containing gluten and starch (Vanessa Natalie J. L., 2019). Stik has a golden yellow color, savory taste with a crunchy texture, and a distinctive cake aroma. It is a popular daily snack for children, teenagers and adults. While processed gotu kola leaf products in the community are currently limited to tea and chips, there is a need for variations in processing to offer alternative that increase the nutritional value of the product.

In addition of food ingredients containing antioxidants is necessary to produce snacks with good nutritional value and acceptability. The characteristics of gotu kola stick ingredients determine the quality of the product. During the sticks-making process, product damage often occurs, such as sticks not being crispy due to an incorrect ratio of ingredients. Moisture content is a critical quality parameter for estimating the shelf life of sticks. Therefore, it is essential to conduct research to understand the effect of adding *Centella asiatica* L. urban leaves on the water content and acceptability of *Centella asiatica* sticks (Herlina, 2016).

The objectives of this research are to analyse the proportion of gotu kola leaves, to examine the difference in water content in sticks with the addition of gotu kola leaves, and to analyse the variations in colour, aroma, texture and taste of gotu kola sticks.

MATERIAL AND METHODS

The organoleptic test was conducted in Gading Hamlet, Suruh District, Trenggalek Regency on June 15, 2022. Meanwhile, the water content test was performed at the Chemistry and Microbiology Laboratory of the Academy of Nutrition Karya Husada Kediri on June 24, 2022. The method employed was experimental with a completely randomized design (CRD) compromising 4 treatments and 3 replications, as follows: 0% (P0); 4% (P1); 6% (P2); and 8% (P3). Data were analyzed using the Friedman Rank test to determine differences between treatments.

The research design used is a completely randomized design (CRD) with 3 treatments and 1 control as follows:

1. Addition of 0% gotu kola leaves
2. Addition of 4% gotu kola leaves
3. Addition of 6% gotu kola leaves
4. Addition of 8% gotu kola leaves

Table.1 Completely Randomized Design

Replication	Treatment			
	Concentration of Gotu Kola Sticks			
	P ₀	P ₁	P ₂	P ₃
R1	X ₀ R ₁	X ₁ R ₁	X ₂ R ₁	X ₃ R ₁
R2	X ₀ R ₂	X ₁ R ₂	X ₂ R ₂	X ₃ R ₂
R3	X ₀ R ₃	X ₁ R ₃	X ₂ R ₃	X ₃ R ₃
Total	ΣX ₀	ΣX ₁	ΣX ₂	ΣX ₃
Rata-Rata	X ₀	X ₁	X ₂	X ₃

Description:

X₀R₁ : Control treatment of replication 1

X₀R₂ : Control treatment replication 2

X₀R₃ : Control treatment of replication 3

X₁R₁ : Treatment of adding gotu kola leaves 4% replication 1

X₁R₂: Treatment of the addition of gotu kola leaves 4% replication 2

X₁R₃: Treatment of the addition of gotu kola leaves 4% replication 3

RESULTS AND DISCUSSION

Water Content

Moisture content is the percentage of water contained in food ingredients. The measurement of moisture content utilizes the Loss on drying (LOD) method with an oven. The principle of the oven method is to evaporate the water in the food material by applying heat at 105°C for a specific duration until a constant weight is achieved. The disparity between the initial weight and the weight after heating represents the water content (Budiman, 2021). The outcomes of the water content test are presented in Table 2.

Table 2. Water Content Test Results of Gotu Kola Sticks

Replication	% Treatment of Each Moisture Content			
	P0 (0%)	P1 (4%)	P2 (6%)	P3 (8%)
I	1,49	2,45	2,39	3,96
II	1,47	2,48	3,82	4,47
III	1,49	2,98	3,46	3,98
Total	4,45	7,91	9,67	12,41
Average	1,48	2,63	3,22	4,13

The results of the moisture content test in Table 1 indicate that all samples falls within the maximum limit of moisture content specified by the quality requirements in SNI 01-2973-1992, which is a moisture content of not more than 5%.

According to the results of the One-way ANOVA statistical test, the water content value of gotu kola leaves sticks is sig = 0.00 (≤ 0.05), indicating that the proportion of added gotu kola leaves has a significant effect on the water content of gotu kola leaves sticks.

The higher the concentration of added gotu kola leaves, the greater the water content, influencing the texture of gotu kola sticks. Water content in food ingredients can impact the appearance, texture, and flavour of the ingredients. Higher water content makes it easier for bacteria, molds, and yeasts to multiply, potentially affecting the crispness and shelf life of the product (Winarno, 2008).

Acceptability

Acceptability refers to an individual's degree of preference for a food product. The acceptability test is conducted to ascertain an individual's evaluation of the quality or characteristics of a food item that can be embraced by the community. Acceptability can be gauged through sensory properties of food, including colour, aroma, texture and taste.

Color

Color is one of the most important factors to consider in organoleptic acceptance testing because it significantly influences food products, enhancing their appeal to panellists (Dian A., 2014).

Table 3. Average Level of Panelist Preference for Gotu Kola Sticks Color

Replication	The average results of panelists' liking level on each proportion of gotu kola leaves			
	P0 (0%)	P1 (4%)	P2 (6%)	P3 (8%)
I	4,1	3,86	3,3	3,43
II	4,00	3,96	3,5	3,56
III	3,93	3,96	3,6	3,4
Total	12,03	11,8	10,4	10,2
Average rank	4,01	3,93	3,46	3,41
Mode	4	4	3	3

Description: p value = 0.000

Table 3. shows the average level of panelists' liking for the color of gotu kola leaves sticks, with the highest value obtained in P0 sticks at 4.01. This implies that the P0 product is the most preferred compared to other products in terms of color.

The results of the Friedman Rank test on the average level of panelists' liking for the color of gotu kola leaves sticks is 0.00 (≤ 0.05), indicating that there is no difference in color acceptance of gotu kola sticks. This is due to the small proportion of gotu kola leaves, which does not alter the color of the stick to green. The percentage of panellists' acceptance is depicted in Figure 1.

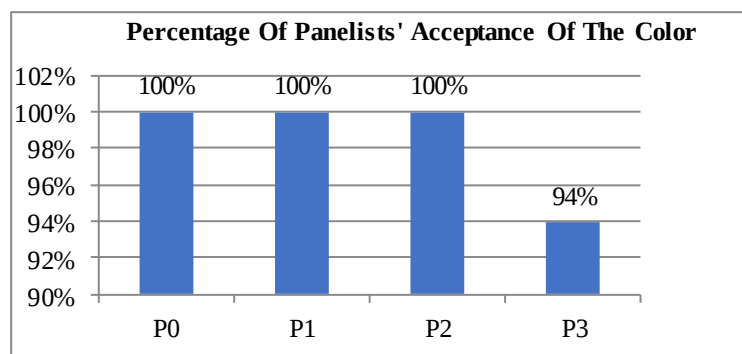


Figure 1. Percentage of Panelists' Acceptance of the Color of Gotu Kola Leaves Sticks

The percentage of panelists' acceptance of the color of gotu kola leaves sticks indicated that the most desirable sticks were P0, P1 and P2. This preference is attributed to the smaller proportion of gotu kola leaves in P0, P1 and P2 compared to the P3 treatment. Panellists preferred the formulations of P0, P1, and P2 because the resulting color is not pale; instead, the color of the sticks tends to be brownish yellow, without being excessively dark as seen in P3.

Chlorophyll in gotu kola leaves is unstable to heat, light, oxygen, and pH. During the frying process of gotu kola leaves sticks, the chlorophyll pigment undergoes degradation. There

are three types of chlorophyll degradation: the phosphitylation reaction, chlorophyllide formation, and oxidation. The feophytination reaction occurs when chlorophyll comes into contact with acid, leading to the loses Mg^{2+} ions and the formation of pheophytin compounds, which impart a brownish-green color. The presence of heat can accelerate the formation of pheophytin compounds (Andarwulan et al., 2012).

Aroma

The aroma of the food influences the panellists even before they start enjoying the food. Aroma plays a crucial role in determining the deliciousness of a food. It is generated through the interaction of substances that evaporate, being slightly soluble in water or oil (Setyaningsih et al., 2010).

Table 4. Average Level of Panelist's Favorability towards the Aroma of Gotu Kola Sticks

Replication	The average results of panelists' liking level on each proportion of gotu kola leaves			
	P0 (0%)	P1 (4%)	P2 (6%)	P3 (8%)
I	4,33	4,00	3,63	3,73
II	4,26	3,96	3,76	3,63
III	4,23	3,9	3,76	3,63
Total	12,83	11,86	11,16	11,00
Average Rating	4,27	3,95	3,72	3,66
Mode	4	4	4	3

Description: p value = 0.000

Table 4. Shows the average level of panelists' preference for the aroma of gotu kola leaves sticks, with the highest value obtained in the P0 stick at 4.27. This implies that the P0 product is the most preferred compared to other products in terms of aroma.

The results of the Friedman Rank test on the average level of panelists' liking for the aroma of gotu kola leaves sticks is 0.00 (≤ 0.05), indicating that there is no difference in the aroma acceptance of gotu kola sticks. This is due to the small proportion of added gotu kola leaves, resulting in a subtle aroma that is not overpowering. The percentage of panelists' acceptance is shown in Figure 2.

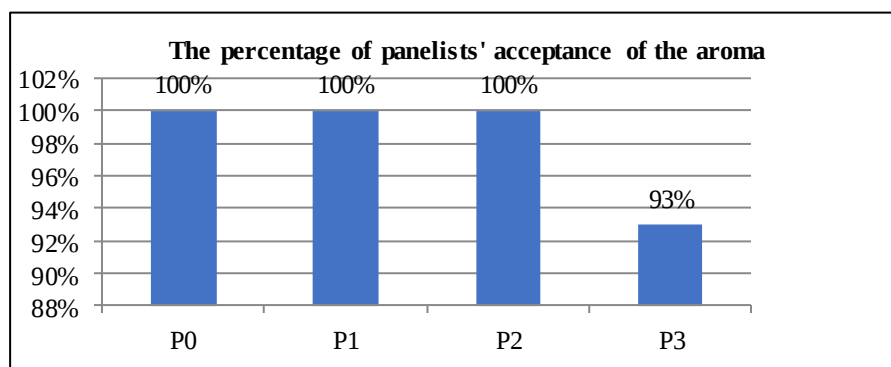


Figure 2. Percentage of Panelists' Acceptance of Aroma of Gotu Kola Leaves Sticks

The percentage of panelists' acceptance of the aroma of gotu kola leaves sticks showed that the most desirable sticks were P0, P1 and P2. This preference is attributed to the smaller proportion of gotu kola leaves in P0, P1 and P2 compared to the P3 treatment. Panellists preferred

formulations P0, P1 and P2 because the aroma produced was savory from coconut milk, had a distinctive flour aroma, and was not overpowering.

This aligns with the opinion of Herliani (2016), that the spices used in making products contain volatile compounds. Volatile compounds in food significantly influence the aroma and flavor characteristics produced. Increasing the concentration of gotu kola leaf addition affects the aroma of the sticks produced. This is because gotu kola leaves have a distinctive aroma that is rarely found in sticks, making panellists unfamiliar with the scent.

Texture

Texture is assessed by the structure of the material, which consists of three elements: mechanical (hardness and suppleness), geometric (gritty and crusty) and mouthfeel (oily and watery) (Seyaningsih, et al., 2010).

Table 5. Average Level of Panelist's Favorite Texture of Gotu Kola Sticks

Replication	The average results of panelists' liking level on each proportion of gotu kola leaves			
	P0 (0%)	P1 (4%)	P2 (6%)	P3 (8%)
I	2,93	3,56	3,96	3,33
II	2,9	3,6	3,9	3,43
III	2,93	3,73	4,00	3,46
Total	8,76	10,9	11,86	10,23
Average Rating	2,92	3,63	3,95	3,41
Mode	3	4	4	3

Description: p value = 0.000

Table 5. Shows the average level of panelists' liking for the texture of gotu kola leaves onion sticks, with the highest value was obtained in P2 sticks at 3.95. This means that the P2 product is the most preferred compared to other products in terms of texture.

The results of the Friedman Rank test on the average level of panelists' liking for the texture of gotu kola leaves onion sticks are (≤ 0.05), meaning that there is no difference in texture acceptance of gotu kola sticks. The percentage of panellists' acceptance is depicted in Figure 3.

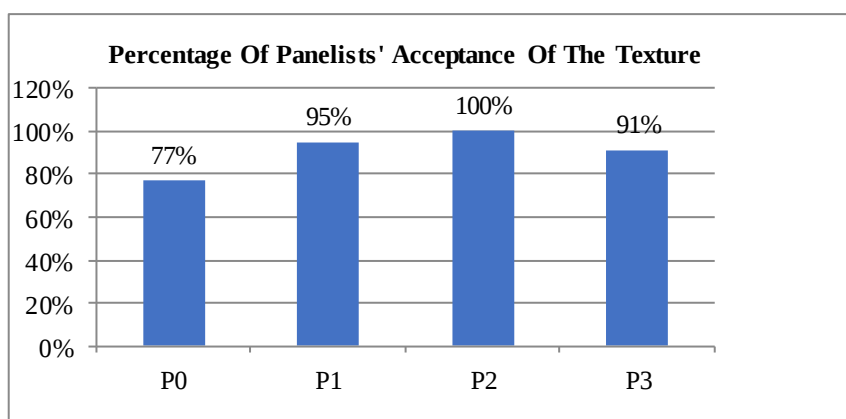


Figure 3. Percentage of Panelists' Acceptance of texture of Gotu Kola Leaves Sticks

The percentage of panelists' acceptance of the texture of gotu kola leaves sticks revealed that P2 was the most preferred. As the proportion of wheat flour increased, the panellists' acceptance of the stick texture significantly decreased. In formulation P2, the texture of the sticks was favoured the most because it had a crunchier texture, according to the panelists. This is due to the proportion of wheat flour, which affects the texture of the sticks, more flour result in a harder

texture. Additionally, the small proportion of gotu kola leaves in P2 contributes to the other treatments.

This observation is supported by the statement of Koswara (2009) that the frying process is crucial in making the dough turn crispy. The frying process causes gluten to coagulate, resulting in a hard and strong texture. Starch gelatinizes to form a sturdy stick structure as the hydrogen chains break. The breaking of hydrogen chain tightens the complex bond between starch and gluten. Before frying, the bonds are soft and flexible, but after frying, they become strong and crispy.

Taste

The sense of taste serves to assess the taste of food. The taste of food can be recognized and distinguished by the taste buds located on the papillae, which is an orange-red stain on the tongue (Winarno, 2004).

Table 6. Average Level of Panelist Preference for the Taste of Gotu Kola Sticks

Replication	The average results of panelists' liking level on each proportion of gotu kola leaves			
	P0 (0%)	P1 (4%)	P2 (6%)	P3 (8%)
I	3,76	4,63	3,9	3,1
II	3,63	4,8	3,83	2,93
III	3,7	4,63	3,83	2,8
Total	11,1	14,06	11,56	8,83
Average	3,7	4,68	3,85	2,94
Mode	4	5	4	3

Description: p value = 0.000

Table 5. Shows the average level of panelists' liking for the taste of gotu kola leaves onion sticks, with the highest value obtained in P1 sticks at 4.68. This means that the P1 product is the most preferred compared to other products in terms of taste.

The significance result of the Friedman Rank test on the average level of panelists' liking for the taste of gotu kola leaves sticks is 0.00 (≤ 0.05), meaning that there is no difference in the acceptability of the taste of gotu kola sticks. The percentage of panelists' acceptance is shown in Figure 4.

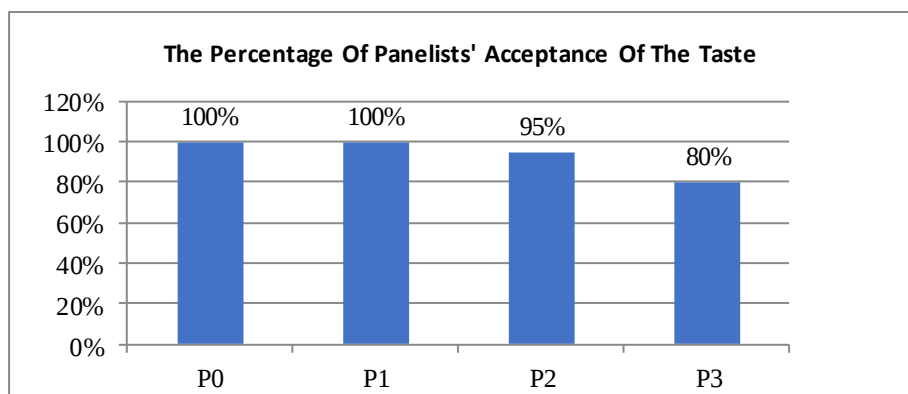


Figure 4. Percentage of Panelists' Acceptance of the Taste of Gotu Kola Leaves Sticks

The percentage of panelists' acceptance of the taste of gotu kola leaves sticks showed that the most preferred sticks were P0 and P1. This preference is attributed to the fact that the proportion of added gotu kola leaves is not excessive, resulting in a flavour that is not overly bitter.

According to Hermawati and Dewi (2014), gotu kola contains chemical compounds that contribute to a bitter taste. The Vellarine content in gotu kola is responsible for the bitterness. Additionally, gotu kola leaves have an astringent taste due to the presence of alkaloids (Sing, et al., 2010).

CONCLUSION AND SUGGESTION

Conclusion

Gotu kola leaves sticks are sticks in which gotu kola leaves are added as a substitute. The results of the analysis of water content showed a significant difference in the concentration of the addition of gotu kola leaves. The average water content in P1 was 2.63%, P2 was 3.22% and P3 was 4.13%. The results of the organoleptic acceptability test analysis showed no differences in the acceptability of color, aroma, texture and taste of gotu kola sticks. The percentage of panellists' acceptance of color indicated a preference for P1 (4% gotu kola leaves) and P2 (6% gotu kola leaves). Similarly, the most preferred aroma was found in P1 (4% gotu kola leaves) and P2 (6% gotu kola leaves), the most preferred texture was in P2 (6% gotu kola leaves), and the most preferred taste was in P1 (4% gotu kola leaves). Sticks with gotu kola leaves formulation involve the substitution of high antioxidant ingredients. Therefore, further research is necessary to explore the antioxidant content and shelf life of gotu kola stick products.

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