e-ISSN 2581-0405
Asian Journal of Applied Research for Community Development and Empowerment
Journal home page: http://ajarcde-safe-network.org ISSN 2581-0405

Application of Gum Arabic and Drying Temperature in Aloe-Buni Instant Drink

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ARTICLE INFO

Article History:
Received: 21 December 2025
Final Revision: 07 January 2026
Accepted: 09 January 2026
Online Publication: 14 January 2026

KEYWORDS

Aloe-buni, functional beverage, arabic gum, instant product, healthy beverage

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A B S T R A C T

Aloe-buni is a functional drink made from aloe vera extract and buni fruit, rich in fiber and antioxidants that are beneficial to health. The purpose of this study was to determine the use of gum arabic and variations in drying temperature on aloe-buni powdered drinks. This study used a complete randomised design (CRD) factorial with two treatment factors: gum arabic filler concentrations of 10%, 20%, and 30%, and drying temperatures of 30°C, 40°C, and 50°C. The results of the study show that the best filling material and drying temperature to maintain the characteristics of Aloe-Buni powdered drink are 30% gum arabic concentration and 40°C heating temperature, which produce the best Aloe-Buni powdered drink with a pH of 4.30; TSS of 41.33°Brix; L* color of 40.92; a* color of 4.86; b* color of 6.71; moisture content of 5.61%; solubility of 98.56%; antioxidant activity of 7.46%; and vitamin C of 66606.44 mg/100ml.

Contribution to Sustainable Development Goals (SDGs):
SDG 2: Zero Hunger
SDG 3: Good Health and Well-Being
SDG 9: Industry, Innovation and Infrastructure
SDG 12: Responsible Consumption and Production

1. INTRODUCTION

1.1. Research Background

Functional beverages in Indonesia are currently experiencing rapid growth, driven by demand for foods and beverages that support health. Functional beverages made from aloe vera gel and buni fruit are among the products that contain bioactive compounds with development potential. Aloe vera is very easy to grow in Indonesia. In beverage production, the part used is the gel from the aloe vera plant [1][2][3][4]. According to Suriati et al. [5], the components of aloe vera gel include water, carbohydrates, protein, saponins, sterols, acemannan, and vitamins A, B, C, and E. Another agricultural product rich in nutritional value is the buni fruit [6][7]. The part that is most often processed is the fruit [8]. Buni fruit is known to have pharmacological activities, including antidiarrheal, antioxidant, anticancer, and antidiabetic [9][10][11]. Buni fruit is usually processed into beverages such as syrup, tea, jelly, jam, fermented drinks (wine), and colouring, and can even be consumed directly due to its sour and sweet taste. Buni fruit in the Philippines is known for its antioxidant properties and its health benefits. Several studies have reported that buni fruit extract contains antibacterial substances [6], glucosidase inhibitors [14], and antidiabetic properties [11][14][15], as well as important compounds that inhibit oxidation [10][16][17]. Formulating aloe vera and buni fruit into a refreshing drink called Aloe-buni, which provides health benefits, is a step towards diversifying beverage products and improving their composition [10][18][19]. This method has not been used in previous studies and requires further research.

A weakness of aloe-buni beverage products is sedimentation due to the high total flavonoid content in buni fruit. [20]. The stability of drinks made from aloe vera gel and buni fruit is a fundamental factor to consider to extend their shelf life [21][22]. To determine the optimal characteristics of health drinks, research is needed on the use of gum arabic and the effects of drying

temperature on the characteristics of Aloe-buni powder drinks. The production of powdered drinks is a processing step that can overcome these problems. Fillers are needed in the production of powdered beverages to ensure optimal powder formation. Gum arabic is a filler that can be added to Aloe-buni beverages. The appropriate concentration needs to be determined, and drying temperature also greatly affects the characteristics of Aloe-buni powdered beverages.

Instant powdered beverages can be produced using several methods. The drying method is less costly and easier to implement, but its production requires more time and energy. Bachtiar [23] and Riri [24] using the foam mat drying method. The advantage of the foam mat drying method is that drying time is short, reducing the risk of nutrient degradation by heat. However, this method is quite expensive and can only be used with liquid products of a certain viscosity [24]. Another method that can be used is the foam mat drying method. Gum arabic is a hydrocolloid used for flavor binding, thickening, thin film formation, and emulsion stabilization. In addition, gum arabic has higher solubility compared to other hydrocolloids [25]. This type of thickener is also heat-resistant in processes that use heat, but it is better to control the heat to shorten heating time, as gum arabic can slowly degrade and lose emulsification efficiency and viscosity. Gum arabic can be used for flavour binding, thickening, thin-film formation, and emulsion stabilisation. Viscosity increases in proportion to the increase in concentration.

1.2. Literature Review

1.2.1. Aloe vera

Aloe vera is a plant that grows widely in tropical regions. There are around 300 types of aloe vera in the world. Currently, only Aloe barbadensis, better known as Aloe vera, can be processed into food. This type of aloe vera plant is widely found in Indonesia. Aloe vera has bright green leaves with irregular white spots. The average weight of the leaves per stem is around 0.5-1 kg. [21]. According to Janurianti [26], Aloe vera has two layers: the green outer leaf skin and the inner gel parenchyma, which is soft, slimy, and colorless. Aloe vera is rich in chemical compounds. It contains as many as 200 active compounds, including sugars, anthraquinones, saponins, vitamins, enzymes, minerals, lignin, salicylic acid, and amino acids. Aloe vera gel fillet is colorless, thick, slimy, and clear with connective tissue. One of the main factors that influences the functional properties of aloe vera gel fillet is the handling of the leaves after harvesting[19].

Aloe vera, which has long been used for hair care, can *be processed into various new food and beverage product*s. The type of aloe vera that can be consumed as food is aloe vera that does not have white spots on its skin. The aloe vera used is 1-4 years old. The leaf stalks are taken from the base of the leaf stalk, which is three to four stalks from the bottom. This plant is easy to grow in home gardens, *drought-resistant, grows quickly, has a high yield, is pest- and disease-resistant*, and is rich in nutrients. Aloe vera flesh contains various minerals, amino acids, fibers, enzymes, vitamins, and various bioactive substances that are beneficial to health. Aloe vera (Aloe barbadensis Miller) is a *plant that has been known for thousands of years and used as a hair tonic, wound healer, and skin care product*. This plant *is easily found in dry areas of* Africa. In general, aloe vera is one of the 10 best-selling plants in the world that has the potential to be developed as a medicinal plant and industrial raw material.

1.2.2. Bignay

Buni is scientifically known as Antidesma bunius (L.) Spreng. This plant is a tree that can reach a height of 15-30 m, with a trunk diameter of around 20-25 cm. It has many branches and is leafy. Male and female flowers of the buni fruit are located on separate trees, arranged in clusters. Female flowers are larger than male flowers. The color of the fruit is initially bright green, turning red when ripe. The fruit is arranged in clusters, round or oval in shape, with a diameter of about 3 cm. The fruit is slightly larger than a pea, initially bright red and very sour, then turning blackish and juicy with a sweet-sour taste [27].

The buni plant can be used to treat the flu, cancer, anemia, impure blood, hypertension, heart palpitations, coughs, syphilis, and gonorrhea [8]. Ripe fruit can be used to treat digestive problems such as dysentery, diabetes, indigestion, and constipation [28]. The fruit can be processed into high-value products, including instant powdered drinks.

1.2.3. Powdered Beverages

Instant powdered beverages are food products in the form of granules (powder) that are easy to use or serve. Instant powdered drinks became popular in the 1990s and remain very popular with the public for their refreshing taste and practicality. They are easy to prepare, requiring only a quick stir to produce a ready-to-drink beverage that can be enjoyed immediately, either with hot or cold water [29]. The advantages of a material when made into powdered drinks are that product quality can be maintained, it is not easily contaminated, it is not susceptible to disease, and the product does not contain preservatives. Using a specific processing method, instant powdered drinks do not affect the material's content [30].

1.2.4. Gum Arab

Gum arabic, also known as acacia gum, is a resin product obtained from tapping the sap of a leguminous tree of the same name (scientific name Acacia senegal). The name "gom arab" (from "gum arabic") literally means "Arabic sap." This plant most likely originated in the desert oases of North Africa, and perhaps also in Southwest Asia. Sudan accounts for 70% of the world's gum arabic production. Gum arabic is widely used in the food and chemical industries. Gum is used as an additive in beverages to reduce the surface tension of water and as a stabilizer. Gum arabic is highly soluble in water, both hot and cold, but is insoluble in organic solvents such as alcohol. Gum arabic also contains a protein component (2%) that is covalently bound in its molecular structure. The main characteristics of gum arabic are texture formation, film formation, binding, stabilizing, and emulsifying. Gum arabic has no taste or odor, so it can be added to food without affecting the organoleptic properties of the food to which it is added. Gum arabic is useful as an emulsifier and stabilizer because it has two sides, a hydrophilic side and a hydrophobic side, making it suitable for emulsifying two different solutions.

1.3. Research Objective

The purpose of this study is to determine the effect of gum arabic filler concentration on Aloe-buni powdered drinks and to determine the effect of drying temperature on Alone-buni powdered drinks.

2. MATERIALS AND METHODS

This study was conducted at the Warmadewa University Processing Laboratory and the food analysis laboratory. This study used a completely randomized design (CRD) factorial pattern with two factors: factor 1, the gum arabic filler concentration (G), with three levels: 10%, 20%, and 30% gum arabic. Factor II was the drying temperature (T) treatment, with 3 levels: T1 = 30℃, T2 = 40℃, and T3 = 50℃. From these treatments, the combination treatments yielded 3x3=9 treatment combinations, each repeated twice, resulting in 18 experimental units.

The equipment used includes digital scales, a blender, a basin, a knife, a tablespoon, a mixing spoon, a strainer, plastic cups, plastic bottles, a cutting board, a chiller, beakers, measuring cups, droppers, analytical scales, Petri dishes, Erlenmeyer flasks, funnels, test tubes, test tube racks, pH meters, viscometers, and incubators. The main materials used were aloe vera leaves (*Aloe barbadensis*, Miller) and bignay fruit (*Antidesma bunius* L.). The materials used in the analysis were NaCl, distilled water, diluting solution, agar medium, and NaOH.

The aloe vera used is from plants that are over 1 year old. There are no white spots on the skin of the aloe vera leaves. Washing is done to remove dirt stuck to the aloe vera leaves. Washing is done under running water. Soaking is done to reduce the yellow sap on the aloe vera leaves, which will affect the final result of the gel. Soaking is done for ± 5 minutes in chlorinated water. The aloe vera leaves are peeled to a thickness of ± 3mm to obtain the gel. To facilitate peeling and crushing, the leaves are cut and the thorns are removed. The aloe vera gel that has been cut and cleaned of its skin is then blanched at a temperature of 80℃ ± 5 minutes to minimize the mucus produced by the aloe vera leaves. The blanched gel is then crushed with a blender. After heating, it is cooled and filtered again to obtain a filtrate free of residue. Gum arabic filler is added at 10%, 20%, and 30% concentrations, depending on the treatment. Drying is carried out in an oven at temperatures of 30°C, 40°C, and 50°C.

3. RESULT AND DISCUSSION

3.1. pH

Based on the analysis of variance, it can be seen that the treatment of gum arabic filler concentration (G) had a significant effect ($p<0.05$) and the drying temperature treatment (T) had a very significant effect ($p<0.01$), while the interaction of the two treatments had no significant impact ($P>0.05$) on the pH of Aloe-Buni powdered drinks. The average pH values of Aloe-Buni drinks resulting from the addition of gum arabic filler and from drying temperature treatments are shown in Table 1.

Table 1. pH of Aloe-Buni Powder Drink

Treatment	Drying Temperature						Average	
Concentration of Gum Arabic	30℃		40℃		50℃			
10%	4.63		4.25		4.21		4.36	a
20%	4.99		4.29		4.33		4.54	a
30%	5.04		4.30		4.50		4.61	a
Average	4.89	a	4.28	b	4.35	b		

Note: Average values followed by the same letter in the same row/column indicate no significant difference ($P>0.05$)

In the treatment with gum arabic filler, the higher the addition, the greater the increase in the pH of the aloe-Buni powder drink. The highest pH was obtained with a 30% addition of gum arabic (4.61), and the lowest was with a 10% addition (4.36). The increase in pH with increased gum arabic addition was due to gum arabic's high molecular weight, complex molecular structure, and high starch content, which make it more hygroscopic and complex. As a result, more water is retained in the material, making it difficult to evaporate. In line with the research

Ref. [31] Reported That Gum arabic has a higher pH than the raw materials, so the more gum arabic is added, the higher the pH. Based on research conducted by Sutardi et al. [32], The pH value of gum arabic is 4.7. When a substance dissolves in water, the ratio of hydrogen ions to hydroxide ions changes. If the number of hydroxyl ions is greater than the number of hydrogen ions, the solution is alkaline and the pH rises, and vice versa [33]. The natural pH of gum from Acacia Senegal ranges from 3.9 to 4.9, which comes from glucuronic acid residue. pH is an acidity standard that determines the quality of powdered beverages after they are dissolved in water. The pH of powdered beverages depends on the type and amount of raw materials used during manufacturing. The pH obtained ranges from 5 to 5.7. The pH test results must be acidic (pH 6-6.8) because it can affect the powder's taste quality.

During the drying temperature treatment, the pH of the aloe-Buni powder drink decreased insignificantly as the drying temperature increased. The highest pH was 4.89 at 30ºC, and the lowest was 4.28 at 40ºC. The decrease in pH with increasing drying temperature was caused by the formation of acids in the product, resulting from enzyme activity and the presence of starch or sugar in the material. Starch molecules tend to attract negatively charged particles. The attraction of OH- ions to the sugar molecules will cause the concentration of H+ ions in the solution to increase, thereby decreasing the pH. Gum arabic acts as a stabilizer, binding water and water-soluble organic acids during the drying process. Therefore, adding more gum arabic will preserve the organic acids in aloe vera powder, as indicated by a decrease in the pH value of aloe vera powder [34]. When a substance is dissolved in water, the ratio of hydrogen ions to hydroxyl ions will change. If the number of hydroxide ions exceeds the number of hydrogen ions, the solution is basic, raising the pH; vice versa. Gum arabic is stable in acidic solutions. The natural pH of gum from Acacia Senegal ranges from 3.9 to 4.9, due to glucuronic acid residues.

https://doi.org/10.29165/ajarcde.v10i1.875

3.2. Vitamin C

Based on the analysis of variance, the gum arabic filler concentration (G) treatment had no significant effect (p>0.05), whereas the drying temperature (T) treatment was significant (p<0.05). while the interaction of the two treatments had no significant effect (P>0.05) on the vitamin C content of Aloe-Buni powdered drinks. The average vitamin C content of Aloe-Buni drinks resulting from the addition of gum arabic filler and drying temperature treatments is shown in Table 2.

Table 2. Vitamin C Aloe-Buni Powder Drink

Concentration	Drying Temperature			Average	
Arabic Gum	30°C	40°C	50°C		
10%	42.08	72.61	58.23	57.64	a
20%	54.03	63.52	56.40	57.98	a
30%	37.77	57.40	39.83	45.00	a
Average	4463.16 a	6451.39 a	5149.17 a		

Note: Average values followed by the same letter in the same row/column indicate no significant difference (P>0.05)

In the treatment of adding gum arabic filler, it was observed that the higher the addition of gum arabic, the more significant the increase in the vitamin C content of aloe-Buni powder. The highest vitamin C content was obtained with a 20% addition of gum arabic, which was 5798.704, and the lowest was with a 30% addition of gum arabic, which was 4500.466. The decrease in vitamin C due to the increase in gum arabic addition is caused by the fact that the higher the concentration of gum arabic, the higher the vitamin C content. This is because gum arabic is a hydrocolloid that can form a gel, thereby protecting vitamin C and other nutrients from oxidative damage. This may also be caused by the fact that gum arabic is a water-soluble component that can bind water [35]. Therefore, the higher the concentration of gum arabic, the stronger its binding power will be, and it will protect vitamin C from damage during the drying process, resulting in higher vitamin C content in aloe-buni powdered beverage products.

In the drying temperature treatment, it can be seen that the higher the drying temperature the more significant the increase in the vitamin C content of the aloe-Buni powder drink. The highest vitamin C content was obtained at (T) 40ºC, which was 6451.391, and the lowest was at a temperature of (T) 40ºC, which was 4463.164. The increase in Vitamin C content due to the increase in drying temperature was caused by the addition of gum arabic in the processing, which can protect important compounds such as vitamins from extreme temperatures, because gum arabic can form a coating and has a strong binding power to the coated compounds [36].

3.3. Antioxidant Activity

Based on the analysis of variance, it can be seen that the treatment of gum arabic filler concentration (G) had no significant effect (p>0.05), and the drying temperature treatment (T) had a significant effect (p<0.05). while the interaction of the two treatments had no significant effect (P>0.05) on the antioxidant activity of Aloe-Buni powdered drinks. The average antioxidant activity levels of Aloe-Buni drinks resulting from the addition of gum arabic filler and the drying temperature treatments are shown in Table 3.

Table 3. Antioxidant Activity of Aloe-Buni Powder Drink

Concentration	Drying Temperature			Average	
Gum Arabic	30°C	40°C	50°C		
10%	7.76	10.83	7.58	8.72	a
20%	16.99	5.91	9.23	10.71	a
30%	27.56	7.46	7.60	14.20	a
Average	17.44 a	8.07 b	8.13 b		

Note: Average values followed by the same letter in the same row/column indicate no significant difference (P>0.05)

In the treatment of adding gum arabic filler, it can be seen that the higher the addition of gum arabic, the higher the antioxidant activity of the aloe-Buni powder drink increases significantly. The highest antioxidant activity was obtained with a 30% addition of gum arabic (14,204), and the lowest was with a 10% addition (8.72). The increase in antioxidant activity with increasing gum arabic addition is because higher concentrations of gum arabic result in greater antioxidant activity. Gum arabic can protect or bind to an active compound found in a food ingredient. In this study, the antioxidant compound bound to gum arabic, so that the antioxidant compound in aloe-buni powdered drinks could be protected by gum arabic. This shows that the higher the use of gum arabic, the higher the antioxidant activity. In addition, gum arabic encapsulation has antioxidant activity.

In the drying temperature treatment, the lowest solubility level was observed at a temperature (T) of 40ºC (8.067), then increased slightly at a temperature (T) of 50ºC (8.134), and then increased further at a temperature (T) of 30ºC (17.439). Antioxidants are also compounds that can inhibit oxidation reactions by binding free radicals and highly reactive molecules. As a result, cell damage is inhibited. Natural antioxidant compounds with proven high antioxidant potential include vitamin C, vitamin E, carotenoids, and polyphenolic compounds such as phenolic acids, flavonoids, tannins, and lignans. This is in accordance with Trissanthi and Wahono [37], that the antioxidant activity produced tends to decrease with longer heating times.

3.4. Total Dissolved Solids

Based on the analysis of variance, it can be seen that the treatment of gum arabic filler concentration (G) had a very significant effect (p<0.01), and the drying temperature treatment (T) had a significant effect (p<0.05), while the interaction of the two treatments had no significant effect (P>0.05) on the total dissolved solids (TSS) of Aloe-Buni powdered drinks. The average TSS values of Aloe-Buni drinks resulting from the addition of gum arabic filler and the drying temperature treatments are shown in Table 4.

Table 4. Total Dissolved Solids (ºBrix) of Aloe-Buni Powdered Drink

Concentration	Drying Temperature			Average	
Gum arabic	30°C	40°C	50°C		
10%	49.00	48.33	52.33	49.89	a
20%	43.67	47.67	49.17	46.83	a
30%	43.50	41.33	42.83	42.56	b
Average	45.39 a	45.78 a	48.11 a		

Note: Average values followed by the same letter in the same row/column indicate no significant difference (P>0.05)

In the treatment of adding gum arabic filler, it can be seen that the higher the addition of gum arabic, the total dissolved solids (TSS) of the aloe-Buni powder drink decreased insignificantly. The highest antioxidant activity was obtained with a 10% addition of gum arabic, which was 49.89, and the lowest was with a 30% addition of gum arabic, which was 42.56. The decrease in TSS due to the addition of gum arabic was caused by its solubility. This was in line with the results of the solubility test for gum arabic concentration. The higher the gum arabic concentration, the longer the solubility time required. Qualitatively, the higher the gum arabic concentration used, the lower the sediment formed. This was due to the function of gum arabic as a stabilizer used in food ingredients. According to Permata and Sayuti [38], explains that the factors affecting the solubility of a solid substance in a liquid are stirring intensity, pH, temperature, solvent composition, particle size, surfactant effect, complex formation, and pressure. In this case, particle size can reduce solubility. The higher the concentration of gum arabic used, the larger the powder particles produced, which affects the solubility of powdered beverages.

In the drying temperature treatment, it was observed that the higher the drying temperature, the greater the increase in TSS of the aloe-Buni powder drink. The highest TSS value was obtained at a temperature (T) of 50ºC, which was 48.11, and the lowest was at a temperature (T) of 30ºC, which was 45.39. The decrease in TSS due to an increase in drying temperature is thought to be caused by the concentration of stabilisers, which is thought to affect the stability (total dissolved solids) of the product. In the study by Ayu Khairunnisa [39], it was found that the higher the concentration of gum arabic stabiliser added, the higher the total solids obtained in powdered beverages.

3.5. Water Content

Based on the analysis of variance, it can be seen that the treatment of gum arabic filler concentration (G) had no significant effect (p>0.05), and the drying temperature treatment (T) had no significant effect (p>0.05). while the interaction of the two treatments had no significant effect (P>0.05) on the moisture content of Aloe-Buni powdered drinks. The average moisture content of Aloe-Buni drinks resulting from the addition of gum arabic filler and from drying temperature treatments is shown in Table 5.

Table 5. Water Content of Aloe-Buni Powdered Drink

Concentration	Drying Temperature			Average	
Arabic Gum	30°C	40°C	50°C		
10%	7.29	6.89	6.45	6.87	a
20%	7.12	6.73	3.62	5.82	a
30%	6.82	5.64	3.08	5.18	a
Average	7.07 a	6.42 a	4.38 a		

Note: Average values followed by the same letter in the same row/column indicate no significant difference (P>0.05).

In the treatment with gum arabic filler, the higher the addition, the greater the decrease in the water content of aloe-Buni powdered drinks. The highest water content was obtained with a 10% addition of gum arabic (6.87), and the lowest was with a 30% addition (5.18). The decrease in water content due to the increase in addition was caused by the fact that gum arabic is composed of proteins covalently bound to macromolecular components. Gum arabic is composed of covalently bound proteins in macromolecular components. Proteins have amino and hydroxyl groups that are hydrophilic. These groups can form hydrogen bonds with one or more water molecules, enabling them to absorb water and retain it within their molecular structure, forming a thick colloid with a gel-like structure. However, gum arabic has a relatively low water-binding capacity. The water-binding capacity of gum arabic can be influenced by proteins with functional groups that bind water. Compared to other hydrocolloids, gum arabic has the lowest water-binding capacity, at around 7.49%.

Water content is a testing parameter to determine the amount of water in a material. In the drying temperature treatment, it was observed that the higher the drying temperature, the more significant the decrease in the water content of aloe-Buni powdered drinks. The highest water content was obtained at a temperature (T) of 30ºC (7.075), and the lowest was at 50ºC (4.384). The decrease in moisture content with increasing drying temperature is due to moisture content being a key parameter for dry products, as the presence of water can degrade product quality [24]. A relatively long heating process. Gum arabic contains proteins consisting of amino acids and hydroxyl groups that are hydrophilic. These hydrophilic groups can form hydrogen bonds with one or more water molecules, enabling them to absorb water and retain it in a single molecule. The more gum arabic is added, the lower the water content becomes. This is because gum arabic can bind water, but its water-binding capacity is relatively low, making it easier for water to evaporate during drying. This is in accordance with Praseptiangga et al. [41]. The water-holding capacity of gum arabic is relatively low compared to other types of hydrocolloids. Water-holding capacity is influenced by the protein's functional groups, which bind water. High water content in powdered products can significantly compromise product stability and cause clumping when stored. High water content in a product can cause damage due to microbial activity.

3.6. Solubility

Based on the analysis of variance, it can be seen that the treatment of gum arabic filler concentration (G) had no significant effect (p>0.05), and the drying temperature treatment (T) had no significant effect (p>0.05). while the interaction of the two treatments had no significant effect (P>0.05) on the solubility of Aloe-Buni powdered drinks. The average solubility values of Aloe-Buni drinks resulting from the addition of gum arabic filler and the drying temperature treatments are shown in Table 6.

Table 6. Solubility of Aloe-Buni Powdered Drink

Concentration	Drying Temperature			Average	
Gum arabic	30°C	40°C	50°C		
10%	98.00	95.81	98.55	97.45	a
20%	96.88	98.06	97.42	97.45	a
30%	95.21	98.56	96.21	96.66	a
Average	96.69 a	97.47 a	97.39 a		

Note: Average values followed by the same letter in the same row/column indicate no significant difference (P>0.05).

In the treatment of adding gum arabic filler, it can be seen that the higher the addition of gum arabic, the higher the solubility of

https://doi.org/10.29165/ajarcde.v10i1.875

the aloe powder drink -Buni decreased significantly. The highest solubility was obtained with a 20% addition of gum arabic, which was 97.449, and the lowest was with a 30% addition of gum arabic, which was 96.659. The decrease observed upon adding gum arabic was due to solubility, the maximum amount of a substance that can dissolve in a given amount of solvent or solution at a given temperature. Water serves as a medium that disperses various compounds in food ingredients. One factor that affects dissolution time is the water content of the material. The higher the water content in instant beverage powder, the longer it takes to dissolve. An increase in the water content of food ingredients forms bonds that cause clumping and require a longer time to break the bonds between particles. The higher the concentration of gum arabic, the longer the dissolution time required. Permata and Kesuma [38], explains that the factors affecting the solubility of a solid substance in a liquid are stirring intensity, pH, temperature, solvent composition, particle size, surfactant effect, complex formation, and pressure. In this case, particle size can be a factor in decreasing solubility. The higher the concentration of gum arabic used, the larger the powder particles produced, which affects the solubility of instant powdered drinks.

Solubility is the time required for all powders to dissolve completely in water. In the drying temperature treatment, the lowest solubility level was found at 30℃ (96.695), then increased at 40℃ (97.475), and then decreased slightly at 50℃ (97.390). This is in line with the research. According to Ref. [42], The solubility of a substance in water is influenced by the water content of the substance. A high water content in a substance makes it difficult to disperse in water because it tends to stick together, preventing the formation of pores. As a result, the substance cannot absorb large amounts of water. In addition, substances with high water content have a narrow surface area that can be wetted because the particles are large and stick together.

3.7. Color

Based on the analysis of variance, the gum arabic filler concentration (G) treatment had a very significant effect ($p>0.01$), while the drying temperature (T) treatment had no significant effect ($p>0.05$). while the interaction of the two treatments had a significant effect ($P<0.05$) on the vitamin C content of Aloe-Buni powdered drinks. The average vitamin C content of Aloe-Buni drinks resulting from the addition of gum arabic filler and drying temperature treatments is shown in Table 7.

Table 7. Colors of Aloe-Buni Powdered Beverages

Concentration	Drying Temperature						Average	
Gum arabic	30℃		40℃		50℃			
10%	4.88		3.69		3.69		4.36	a
20%	6.11		5.51		5.51		5.48	b
30%	6.78		4.86		4.86		7.33	a
Average	5.92	ab	4.69	b	4.69	a		

Note: Average values followed by the same letter in the same row/column indicate no significant difference ($P>0.05$).

In the treatment of adding gum arabic filler, it was observed that the higher the addition of gum arabic, the more significant the increase in the a* color value of the aloe-Buni powder drink. The highest a* color value was obtained with a 50% addition of gum arabic, which was 7.33, and the lowest was with a 30% addition of gum arabic, which was 4.36. According to Widiantoko and Yunianta [43], the addition of stabilisers in food products does not affect the final product, as gum arabic stabilisers are brownish-white in powder form but become clear or bright when dissolved. Gum arabic has low viscosity and no taste or color, so it can be added in specific amounts without affecting the organoleptic properties of food products.

Based on the results of the a* color test analysis of aloe-buni powdered drinks based on drying temperature treatment, there were significant differences. At drying temperatures of 30℃ to 50℃, there was a continuous decrease, with an increase only at the highest gum arabic concentration (30%) and 50℃, which increased by 10.35. An increase in storage temperature stimulates the hydrolysis of glycosidic bonds between aglycone and glycone groups in the anthocyanin structure. This hydrolysis produces aglycone groups that can be readily structurally transformed into colourless chalcone compounds. The decrease in redness value was due to an increase in the reaction rate of the structural transformation of flavilum cations (red) into chalcones (colorless). The increase in a* color at a temperature of 50℃ was due to the addition of 30% gum arabic concentration, which occurred because of the high gum arabic concentration. This is also in line with the research conducted by Widiantoko and Yunianta [43]. Gum arabic is a natural stabiliser that is colourless, odourless, and tasteless, so it does not affect the colour, aroma, or taste of food.

4. CONCLUSION

Gum arabic concentration 30% and a heating temperature of 40°C produce the best Aloe-buni powdered drink, with a pH of 4.30; TSS of 41.33 °Brix; L* color of 40.92; a* color of 4.86; b* color of 6.71; water content of 5.61%; solubility of 98.56%; antioxidant activity of 7.46%; and vitamin C content of 66,606.44 mg/100ml. Further research is recommended to test the bioactive compounds present in the powder, its shelf life, and its packaging.

REFERENCE

[1] B. Ozturk, O. Karakaya, K. Yildiz, And O. Saracoglu, “Effects Of Aloe Vera Gel And Map On Bioactive Compounds And Quality Attributes Of Cherry Laurel Fruit During Cold Storage,” *Sci. Hortic. (Amsterdam).*, Vol. 249, No. November 2018, Pp. 31–37, 2019, Doi: 10.1016/J.Scienta.2019.01.030.

[2] A. Parven, M. R. Sarker, M. Megharaj, And I. Md. Meftaul, “Prolonging The Shelf Life Of Papaya (Carica Papaya L.) Using Aloe Vera Gel At Ambient Temperature,” *Sci. Hortic. (Amsterdam).*, Vol. 265, No. January, P. 109228, 2020, Doi: 10.1016/J.Scienta.2020.109228.

[3] H. Liu, S. Liu, B. Du, K. Dong, Y. Wang, And Y. Zhang, “Aloe Vera Gel Coating Aggravates Superficial Scald Incidence In ‘Starking’ Apples During Low-Temperature Storage,” *Food Chem.*, Vol. 339, No. July 2020, P. 128151, 2021, Doi: 10.1016/J.Foodchem.2020.128151.

[4] S. K. Sonawane, J. S. Gokhale, M. Z. Mulla, V. R. Kandu, And S. Patil, “A Comprehensive Overview Of Functional And Rheological Properties Of Aloe Vera And Its Application In Foods,” *J. Food Sci. Technol.*, Vol. 58, No. 4, Pp. 1217–1226, 2021, Doi: 10.1007/S13197-020-04661-6.

[5] L. Suriati, I. M. S. Utama, B. A. Harjosuwono, And I. B. W. Gunam, "Stability Aloe Vera Gel As Edible Coating," *Iop Conf. Ser. Earth Environ. Sci.*, Vol. 411, No. 1, 2020, Doi: 10.1088/1755-1315/411/1/012053.

[6] J. M. Barcelo, A. R. M. Nullar, J. K. P. Caranto, A. M. Gatchallan, And I. J. B. Aquino, "Antioxidant And Antimutagenic Activities Of Ripe Bignay (Antidesma Bunius) Crude Fruit Extract," *Philipp. E-Journal Appl. Res. Dev.*, Vol. 6, No. 2013, Pp. 32–43, 2016.

[7] M. Shariful Islam, M. Sharif Ahammed, F. Islam Sukorno, S. Ferdowsy Koly, M. Morad Biswas, And S. Hossain, "A Review On Phytochemical And Pharmacological Potentials Of Antidesma Bunius," *J. Anal. Pharm. Res.*, Vol. 7, No. 5, 2018, Doi: 10.15406/Japlr.2018.07.00289.

[8] L. Suriati *Et Al.*, "Characteristics Of Aloe-Buni Powdered Drinks With The Addition Of Gum arabicAnd Drying Temperature Variations," *J. Agric. Crop.*, No. 93, Pp. 357–364, May 2023, Doi: 10.32861/Jac.93.357.364.

[9] A. Udomkasemsab, C. Ngamlerst, P. Adisakwattana, A. Aroonnual, R. Tungtrongchitr, And P. Prangthip, "Maoberry (Antidesma Bunius) Ameliorates Oxidative Stress And Inflammation In Cardiac Tissues Of Rats Fed A High-Fat Diet," *Bmc Complement. Altern. Med.*, Vol. 18, No. 1, Pp. 1–11, 2018, Doi: 10.1186/S12906-018-2400-9.

[10] M. Yusuf, Pirman, U. A. Nur Fitriani, I. Amri, And A. I. Juwita, "Identifications Of Polyphenols And A-Amylase Inhibitory Activity Of Multi Herbal Formulation: Cocoa Beans (Theobroma Cocoa), Buni (Antidesma Bunius L. Spreng) And Cinnamons (Cinnamomum Cassia)," *J. Phys. Conf. Ser.*, Vol. 1783, No. 1, 2021, Doi: 10.1088/1742-6596/1783/1/012004.

[11] P. Aksornchu *Et Al.*, "Inhibitory Effect Of Antidesma Bunius Fruit Extract On Carbohydrate Digestive Enzymes Activity And Protein Glycation In Vitro," *Antioxidants*, Vol. 10, No. 1, Pp. 1–18, 2021, Doi: 10.3390/Antiox10010032.

[12] A. Udomkasemsab *Et Al.*, "Maoberry (Antidesma Bunius) Improves Glucose Metabolism, Triglyceride Levels, And Splenic Lesions In High-Fat Diet-Induced Hypercholesterolemic Rats," *J. Med. Food*, Vol. 22, No. 1, Pp. 29–37, 2019, Doi: 10.1089/Jmf.2018.4203.

[13] G. Hardinasinta, M. Mursalim, J. Muhidong, And S. Salengke, "Determination Of Some Chemical Compounds Of Bignay (Antidesma Bunius) Fruit Juice," *Food Sci. Technol.*, Vol. 2061, Pp. 1–6, 2020, Doi: 10.1590/Fst.27720.

[14] I. L. Lawag, A. M. Aguinaldo, S. Naheed, And M. Mosihuzzaman, "A-Glucosidase Inhibitory Activity Of Selected Philippine Plants," *J. Ethnopharmacol.*, Vol. 144, No. 1, Pp. 217–219, Oct. 2012, Doi: 10.1016/J.Jep.2012.08.019.

[15] W. H. El-Tantawy, N. D. Soliman, D. El-Naggar, And A. Shafei, "Investigation Of Antidiabetic Action Of Antidesma Bunius Extract In Type 1 Diabetes," *Arch. Physiol. Biochem.*, Vol. 121, No. 3, Pp. 116–122, 2015, Doi: 10.3109/13813455.2015.1038278.

[16] R. C. M. Lizardo, L. B. Mabesa, E. I. Dizon, And N. A. Aquino, "Functional And Antimicrobial Properties Of Bignay [Antidesma Bunius (L.) Spreng.] Extract And Its Potential As Natural Preservative In A Baked Product," *Int. Food Res. J.*, Vol. 22, No. 1, Pp. 88–95, 2015.

[17] C. Ngamlerst, A. Udomkasemsab, R. Kongkachuichai, K. Kwanbunjan, C. Chupeerach, And P. Prangthip, "The Potential Of Antioxidant-Rich Maoberry (Antidesma Bunius) Extract On Fat Metabolism In Liver Tissues Of Rats Fed A High-Fat Diet," *Bmc Complement. Altern. Med.*, Vol. 19, No. 1, Pp. 1–12, 2019, Doi: 10.1186/S12906-019-2716-0.

[18] V. A. Devianti And R. K. Wardhani, "Degradasi Vitamin C Dalam Jus Buah Dengan Penambahan Sukrosa Dan Lama Waktu," *J. Res. Technol.*, Vol. 4, No. 1, Pp. 41–46, 2018.

[19] L. Suriati, I. M. S. Utama, B. A. Harsojuwono, And I. B. W. Gunam, "Incorporating Additives For Stability Of Aloe Gel Potentially As An Edible Coating," *Aims Agric. Food*, Vol. 5, No. 3, Pp. 327–336, 2020, Doi: 10.3934/Agrfood.2020.3.327.

[20] G. Hardinasinta, M. Mursalim, J. Muhidong, And S. Salengke, "Degradation Kinetics Of Anthocyanin, Flavonoid, And Total Phenol In Bignay (Antidesma Bunius) Fruit Juice During Ohmic Heating," *Food Sci. Technol.*, Vol. 42, Pp. 1–11, 2022, Doi: 10.1590/Fst.64020.

[21] L. Suriati And I. M. S. Utama, "Characteristic Fillet Of Aloe Vera Gel As Edible Coating," *J. Phys. Conf. Ser.*, Vol. 1402, No. 6, 2019, Doi: 10.1088/1742-6596/1402/6/066021.

[22] L. Suriati And N. M. A. Suardani, "Application Ecogel Incorporation Additive For Maintain Freshness Of Strawberry Fruit During Storage," *Iop Conf. Ser. Mater. Sci. Eng.*, Vol. 1098, No. 6, P. 062055, 2021, Doi: 10.1088/1757-899x/1098/6/062055.

[23] R. Bachtiar, "Pembuatan Minuman Instan Sari Kurma (Phoenix Dactylifera)," 2011.

[24] Y. Riri, "Karakteristik Fisiko Kimia Dan Organoleptik Minuman Serbuk Instan Dari Campuran Sari Buah Pepino (Solanum Muricatum, Aiton.) Dan Sari Buah Terung Pirus (Cyphomandra Betacea, Sent.)," 2016, *Universitas Andalas*.

[25] F. Puji Astuti, O. Syenni Datu, And T. Ekawati Tallei, "Effects Of Addition Benzoic Acid On Yeast Growth And Alcohol Content On The Fermentation Of Local Pineapple (Ananas Comosus L.) Skin," *Pharmacon*, Pp. 432–442, 2020.

[26] D. Janurianti, "Stabilisasi Gel Lidah Buaya Dengan Penambahan Gum Arab Dan Aplikasinya Sebagai Edible Coating Pada Buah Stroberi," Universitas Udayana, 2020.

[27] A. A. S. M. Chindrawati, L. Suriati, I Gede Pasek Mangku, And L. K. Datrini, "Characteristics Of Aloe-Buni Drink With Proportion Treatment Of Aloe-Gel And Buni Extract At Different Temperatures," *Seas (Sustainable Environ. Agric. Sci.*, Vol. 6, No. 1, Pp. 23–33, 2022, Doi: 10.22225/Seas.6.1.4897.23-33.

[28] A. Kassem And A. Abdullah, "Dietary Gum Arabic Supplementation Alter Plasma And Tissue Antioxidant And Free Radical Scavenging Activities In Sprague Dawley Male Rats," *J. Biol. Life Sci.*, Vol. 6, No. 1, P. 127, 2015, Doi: 10.5296/Jbls.V6i1.6818.

[29] O. P. Winandari, N. Widiani, M. Kamelia, And E. P. Rizki, "Potential Of Vitamin C And Total Acid As Antioxidants Of Rosella Kombucha With Different Fermentation Times," *J. Pembelajaran Dan Biol. Nukl.*, Vol. 8, No. 1, Pp. 141–148, Mar. 2022, Doi: 10.36987/Jpbn.V8i1.2471.

[30] F. N. Minah, Y. R. Aulia, And F. Rahmadani, "Pembuatan Minuman Serbuk Mix Fruit Kaya Vitamin C Dan Antioksidan Untuk Meningkatkan Imunitas Tubuh," *Atmosphere (Basel).*, Vol. 2, No. 1, Pp. 14–22, 2021.

[31] Susianti, U. Amalia, And L. Rianingsih, "Penambahan Gum Arab Dengan Konsentrasi Yang Berbeda Terhadap Kandungan Senyawa Volatil Bubuk Rusp Ikan Teri (Stolephorus Sp.)," *J. Ilmu Dan Teknol. Perikan.*, Vol. 2, No. 1, Pp. 10–19, 2020.

[32] . Sutardi, S. Hadiwiyoto, And C. R. N. Murti, "Pengaruh Dekstrin Dan Gum Arab Terhadap Sifat Kimia Dan Fisik Bubuk Sari Jagung Manis (Zeamays Saccharata) [The Effects Of Dextrin And Gum arabicOn Chemical And Physical Properties Of Sweet Corn (Zeamays Saccharata) Milk-Like Powder]," *J. Teknol. Dan Ind. Pangan*, Vol. 21, No. 2, Pp. 102–102, 2010.

[33] I. D. G. P. Prabawa, R. Salim, N. Khairiah, H. Ihsan, And R. Y. Lestari, "Review Xanthan Gum: Produksi Dari Substrat Biomassa, Variabel Efektif, Karakteristik Dan

 https://doi.org/10.29165/ajarcde.v10i1.875

Regulasi Serta Aplikasi Dan Potensi Pasar," *J. Ris. Ind. Has. Hutan*, Vol. 11, No. 2, P. 97, 2020, Doi: 10.24111/Jrihh.V11i2.5649.

[34] M. S. P. Lubis, R. J. Nainggolan, And E. Yusraini, "Pengaruh Perbandingan Nenas Dengan Bit Dan Konsentrasi Gum Arab Terhadap Mutu Fruit Leather Nenas," *J. Rekayasa Pangan Dan Pertan.*, Vol. 5, No. 2, Pp. 267–274, 2017.

[35] R. T. M. Novitasari, A. D. Anggo, And T. W. Agustini, "Pengaruh Kombinasi Bahan Pengisi Maltodextrine Den Karagen Terhadap Karakteristik Bubuk Flavor Lemi Dari Rajungan," *J. Ilmu Dan Teknol. Perikan.*, Vol. 3, No. 1, Pp. 16–25, 2021.

[36] S. Fauziah, U. H. Hasyim, S. Maresa, I. Purnawan, And T. Y. Hendrawati, "Pengaruh Edible Coating Aloe Vera Terhadap Daya Tahan Apel, Wortel Dan Stroberi Selama Penyimpanan," *Semin. Nas. Penelit. Lppm Umj*, Vol. 1, No. 1, 2020.

[37] C. M. Trissanthi And W. H. Susanto, "Pengaruh Konsentrasi Asam Sitrat Dan Lama Pemanasan Terhadap Karakteristik Kimia Dan Organoleptik Sirup Alang-Alang (Imperata Cylindrica) Influence Of The Concentration Of Citric Acid And Time Heating To The Chemical And Organoleptical Characteristic Of," *J. Pangan Dan Agroindustri*, Vol. 4, No. 1, Pp. 180–189, 2016.

[38] S. Permata, D. A Dan Kusuma, "Pembuatan Minuman Serbuk Instan Dari Berbagai Bagian Tanaman Meniran (Phyllanthus Niruri)," *J. Teknol. Pertan. Andalas*, Vol. Vol. 20, No. 1, P. 1, 2016, [Online]. Available: Tpa.Fateta.Unand.Ac.Id/Index.Php/Jtpa/Article/Download/31/Pdf_12

[39] D. M. Ayu Khairunnisa, "Optimasi Formula Dan Uji Aktivitas Antioksidan Minuman Instan Jahe Merah (Zingiber Officinalevar. Roscoe)Dengan Metode Dpph," *J. Heal. Med. Sci.*, Vol. 1, Pp. 77–84, 2022.

[40] E. Bekti, Y. Prasetyowati, And S. Haryati, "Berbagai Konsentrasi Cmc (Carboxyl Methyl Cellulose) Terhadap Sifat Fisikokimia Dan Organoleptik Selai Labu Siam (Sechium Edule)," *J. Teknol. Pangan Dan Has. Pertan.*, Vol. 14, No. 2, Pp. 41–52, 2019.

[41] D. Praseptiangga, T. P. Aviany, And N. H. R. Parnanto, "Pengaruh Penambahan Gum Arab Terhadap Karakteristik Fisikokimia Dan Sensoris Fruit Leather Nangka (Artocarpus Heterophyllus)," *J. Teknol. Has. Pertan.*, Vol. 9, No. 1, Pp. 71–83, 2016, Doi: 10.20961/Jthp.V9i2.12858.

[42] M. Gardjito, A. Murdiati, And N. Aini, "Mikroenkapsulasi B-Karoten Buah Labu Kuning Dengan Enkapsulan Whey Dan Karbohidrat," *J. Teknol. Pertan.*, Vol. 2, No. 1, Pp. 13–18, 2006.

[43] R. K. Widiantoko And Yunianta, "Pembuatan Es Krim Tempe - Jahe (Kajian Proporsi Bahan Dan Penstabil Terhadap Sifat Fisik , Kimia Dan Organoleptik) The Making Of Ice Cream From Tempe And Ginger (Study Of Raw Materials Proportion And Stabilizers Proportions On The Physical , Chemical A," *J. Pangan Dan Agroindustri*, Vol. 2, No. 1, Pp. 54–66, 2014.