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Conference Paper

The Characteristics Physicochemical of Instant Drink From Groove Leaves (*Suaeda maritima*) Using Maltodextrin Of Taro Tubers

Dedin Finatsiyatull Rosida[1,2]*, Ratna Yulistiani[1], Ratna Nur Fitria Mabbrury[1]

[1]Departement of Food Technology, Faculty of Engineering
[2]The center innovation of appropriate technology of lowland and coastal food, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Surabaya 60294, Indonesia

*Corresponding author:
E-mail:
dedin.tp@upnjatim.ac.id

ABSTRACT

Leaf groove is rich in antioxidants so they can be beneficial for health. Leaf grooves have a weakness which is a salty taste, so to reduce the salty taste, a soaking process is carried out and made into food products that are easier to consume. The instant drink is one product that is easy to implement for the public. The process of making instant drinks needs to be added with fillers. The filler used in this study was maltodextrin from taro tubers. In general, maltodextrin is made from cassava. The function of maltodextrin can increase volume, accelerate drying, increase solubility, and can coat flavor components. This study aims to determine the effect of the ratio of the extract of the groove leaves and the concentration of maltodextrin from the taro tubers on the physicochemical and organoleptic characteristics of the instant drink. This study used a factorial completely randomized design (CRD) with two factors. The first factor was the ratio of groove leaf extract and water (1:1, 1:2, and 1:3). The second factor was the concentration of taro tuber maltodextrin (5%, 10%, and 15%). The data obtained were analyzed using ANOVA, if there was a significant difference, it was continued with Duncan's Test (DMRT). The results showed that the treatment of dilution of groove leaf extract (1:1) with the addition of 15% maltodextrin was the best treatment that produced a grooved instant drink with a water content of 3.87%, ash 3.75%, salt 0.60%, solubility 91.947%, and the organoleptic Hedonic Scale Scoring test includes color 5.88 (like very much), taste 4.54 (likes) and aroma 4.8 (likes).

Keywords: Instant drink, groove leaf, maltodextrin, taro tuber

Introduction

Groove plants are herbaceous plants that have green and red leaves. This groove plant is generally consumed fresh or processed. The utilization of the groove plant is very less because it has a salty taste. In this study, an immersion process was carried out to reduce the salty taste. Ravikumar et al. (2011) state groove plants have antioxidant, antibacterial, and hepatoprotective effects. Based on the results of the antioxidant activity test, groove leaf extract (*Suaeda maritimea*) was able to capture DPPH free radicals with an IC50 value of 91.70 g/ml. According to Sudjaroen (2015) get groove plants to have a total phenol of 13 mgGAE/g. Based on these data, it is necessary to do research on the application of grooved plants into food products, namely by using them as instant drinks.

Instant drinks are drinks in the form of powder or flour which in their use are easily soluble in water (Wasmun et al, 2016). The process of making instant drinks consists of making extracts or juices, mixing ingredients and drying, in making juices it is necessary to add water. In this study, the water added was different. This was done because he wanted to know the effect of the dilution

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in making instant drinks. The process of groove leaves into instant drinks needs to be added with fillers such as maltodextrin, Arabic gum, and sweeteners.

Commercial maltodextrin is generally made from the hydrolysis of cassava starch, even though many other tubers can be used as raw materials for making maltodextrin, one of which is taro tuber (*Colacosia esculenta L. Schott*). Taro is one of the many tubers in Indonesia but its utilization has not been maximized. Taro has the potential to be used as a raw material for maltodextrin because it has a high starch content, which is 70-80% (Syarief & Estiasih, 2013). The function of maltodextrin is to coat the flavor components, increase the volume, speed up the drying process, prevent heat damage, and increase the solubility of hedonic quality characteristics of instant drinks (Oktaviana, 2012). However, maltodextrin has a low viscosity, so to increase the viscosity of instant drinks, it is necessary to add hydrocolloid materials. One of the commonly used hydrocolloid materials is gum arabic.

Gum arabic is easily soluble in water. In addition to its high solubility, the main characteristics of gum arabic are texture-forming, film-forming, binding, and also good emulsifiers in the presence of protein components in gum arabic (Cameiro et al., 2013). Another function of gum arabic is to improve the viscosity, texture, and shape of food products (Yuliani et al., 2007).

Material and Methods

The ingredients used in making instant drinks were groove leaf extract, taro tuber maltodextrim, Arabic gum, and stevia sugar. The materials used for the analysis were distilled water, NDF solution, $AgNO_3$ solution, calcium chloride, acetic acid, Na_2SO_3.

The experimental design used in this study was a completely randomized design (CRD) consisting of 2 factorials, the first was the dilution of the groove leaf extract (1:1, 1:2, 1:3) and the second factor was the concentration of taro tuber maltodextrin (5%, 10). %, 15%). The data obtained were continued by using the ANOVA and DMRT tests. The research stages are as follows:

Production of taro tuber maltodextrin

A total of 200 g of taro starch was added to 1000 ml of $CaCl_2$ 200 ppm solution. Then the pH of the suspension was adjusted to 6-7 with the addition of 0.1N NaOH. The starch was gelatinized at 80°C for 5 minutes. Then added the enzyme $\propto$ -amylase 0.09% (w/v) as much as 1.4 ml while the stirring process was carried out by heating at a temperature of 60˚C for 120 minutes. The cooling process was carried out at a temperature of 30-40˚C. The HCl 0.1 N solution was added until pH 3-4 was reached. After cooling, the maltodextrin suspension was neutralized using NaOH until a pH of 4.5-6.5 was reached. The obtained maltodextrin was dried at 50ºC for 6-8 hours.

Groove Instant Drink Production

Grooved leaf extract for each treatment (1:1 ; 1:2 ; 1:3) was added with maltodextrin (5%, 10%, and 15%) of the total volume of groove leaf extract and 300 ml of maltodextrin. As much as 2% Arabic gum (w/v) and 5% stevia sugar (w/v) were added. The process of mixing the ingredients until homogeneous. The dough was dried at 60°C for 6 hours.

Results and Discussion

Characteristics of raw materials

The salt content of groove leaf extract was 4.02 ± 0.23%, while the ratio of groove extract and water (1:1) was 1.33 ± 0.07%; ratio (1:2) was 0.75 ± 0.02% and the ratio (1:3) was 0.48 ± 0.03%. The characteristics of taro tuber maltodextrin include: water content, Dextrose Equivalent (DE), and solubility can be seen in Table 1.

Table 1 showed that the water content of taro starch and maltodextrin was 10.01% and 4.83%, respectively. The maximum water content of maltodextrin is 5%. Dextrose equivalent results obtained from the analysis of raw material for taro tuber maltodextrin was 9.48. The maltodextrin DE 5-12 is good for use as an encapsulation coating material. The results of Susanti's

research (2018) the DE value of Yam tuber maltodextrin produced is 14.46. The results of Husniati's research (2009) show that the DE value of cassava tuber maltodextrin is 9.61. The DE value of sweet potato maltodextrin is 7.41 (Maulani et al, 2012). This difference in DE value is influenced by temperature, time, and concentration of enzymes used during the maltodextrin manufacturing process.

Table 1. Characteristics of maltodextrin from taro tubers

Parameter	Taro Starch	Ref	Maltodextrin of Taro Tuber	Ref
Water Content (%)	10.01 ± 0.08	Max. 14[a]	4.83 ± 0.25	Max. 5[b]
Dextrose Equivalen (DE)	-	-	9.48 ± 0.29	5-12[c]
Solubility (%)	-	-	97.01± 0.04	Min. 97[d]

Source : [a](SNI, 2011), [b](SNI, 2010), [c](Subekti, 2008), [d](SNI, 1992)

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Physicochemical properties of groove instant drink

The water content of groove instant drink

Table 2 showed that the average water content of instant drinks in the dilution treatment of groove leaf extract ranged from 4.12 to 4.48%. The 1:3 treatment had the lowest water content of 4.12%, while the 1:1 treatment had the highest water content of 4.48%. The higher the dilution carried out, the lower the water content of instant drinks. This was less food fiber in the product that binds to water. Dietary fiber has hydroxyl groups that will bind to water so the more hydroxyl groups that bind to water, the higher the water content of a food product. The fewer hydroxyl groups that bind to water the lower the water content. Dietary fiber can bind water because it has a hydroxyl group. Sudjaroen (2015) get the total dietary fiber content of fresh groove leaves is 21.99%.

Table 2. The results of the water content of instant drinks on the treatment of groove leaf extract

Ratio groove leaf extract and water	Water Content (%)	DMRT
1 : 1	4.48 ± 0.58[a]	0.7987
1 : 2	4.29 ± 0.75[a]	0.7603
1 : 3	4.12 ± 0.78[a]	-
Maltodextrin (%)		
5	4.99 ± 0.05[c]	0.7987
10	4.32 ± 0.26[b]	0.7603
15	3.59 ± 0.25[a]	-

Note: The average value accompanied by the same letter means that it is not significantly different (p≥0.05)

Table 2 showed that the average water content of instant drinks in the maltodextrin concentration treatment ranged from 3.59-4.99%. The higher the concentration of maltodextrin

caused the lower the water content of instant drinks. This is because maltodextrin will bind to the surrounding water molecules. The maltodextrin used in this study had a low DE value which had low binding properties with water. That during the drying process, the water will evaporate easily. Ernawati et al. (2014) state the higher the maltodextrin, the faster the evaporation of water so that the water content decreases.

Salt level of groove instant drinks

Figure 1 showed that the average salt content of instant drinks ranges from 0.25-0.89%. The treatment of groove leaf extract (1:3) with the addition of 15% maltodextrin resulted in the lowest salt content of 0.25%, while the treatment of groove leaf extract (1:1) with the addition of 5% maltodextrin produced the highest salt content of 0.89 %.

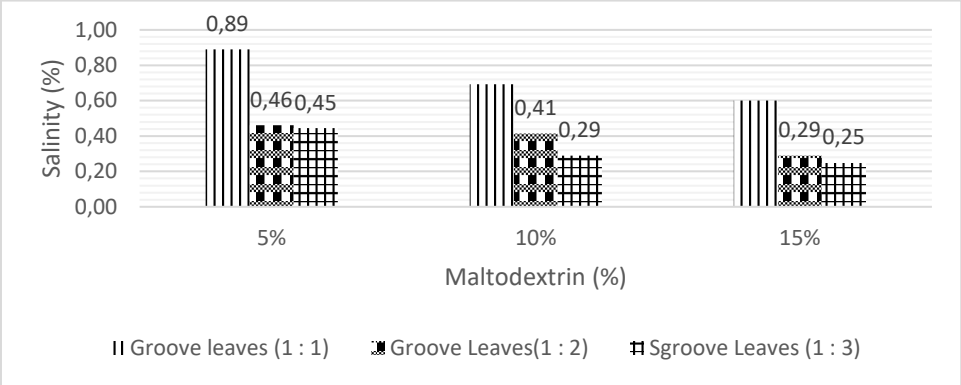

Figure 1. The salinity of instant drink in the treatment of groove leaf extract with the addition of taro maltodextrin

Figure 1. showed that the higher the dilution of the groove leaf extract and the higher the maltodextrin concentration of taro tubers, the lower the salt content of the instant drink. This was because the groove leaves have a salt content (4.02%) so the higher the dilution, the lower the proportion of groove leaves added, and the higher the maltodextrin concentration will increase the total solids in the grooved instant drink. The total solids will reduce the proportion of components that are added. Another one of them is salt so the salt content in instant drinks decreased. Maltodextrin as a filler can increase the total solids of a food product.

Ash content of groove instant drinks

Table 3 showed that the average ash content of instant drinks in the dilution treatment of groove leaf extract ranged from 2.98 to 3.92%. The higher the dilution of the groove leaf extract was the lower the ash content of the instant drink. This was due to the lower concentration of groove leaf added.

Table 3. The ash content of instant drinks on the treatment of the extract groove leaf and maltodextrin

Ratio groove leaf extract and water	Ash (%)	DMRT
1 : 1	3.92 ± 0.14^{c}	0.5132
1 : 2	3.44 ± 0.44^{b}	0.4886
1 : 3	2.98 ± 0.19^{a}	-
Maltodextrin (%)		
5	3.62 ± 0.46^{b}	0.5132
10	3.45 ± 0.44^{b}	0.4886
15	3.26 ± 0.51^{a}	-

Note: The average value accompanied by the same letter means that it is not significantly different (p≥0.05)

Table 3 showed that the average ash content of instant drinks on the addition of maltodextrin treatment of taro tubers ranged from 3.26 to 3.62%. The higher the concentration of maltodextrin was the lower the ash content of the instant drink produced. This was because the addition of maltodextrin caused other components to decrease so that the ash content of instant drinks was lower.

Groove instant drink solubility

Table 4 showed that the average solubility of instant drinks in the treatment of groove leaf extract ranged from 87.55-87.94%. The 1:3 treatment had the lowest water content of 87.55%, while the 1:1 treatment had the highest water content of 87.94%. The higher the dilution of the groove leaf extract was the lower the solubility of instant drinks, but the decrease in solubility of instant drinks was not significantly different.

Table 4. The solubility of instant drinks on the treatment of the extract groove leaf and maltodextrin

Ratio groove leaf extract and water	Solubility (%)	DMRT
1 : 1	87.94 ± 4.01^{a}	1.1965
1 : 2	87.82 ± 3.99^{a}	1.1390
1 : 3	87.55 ± 3.81^{a}	-
Maltodextrin (%)		
5	83.81 ± 0.12^{a}	-
10	87.81 ± 0.16^{b}	1.1390
15	91.68 ± 0.33^{c}	1.1965

Note: The average value accompanied by the same letter means that it is not significantly different ($p \geq 0.05$)

Table 4 showed that the average solubility of instant drinks in the addition of maltodextrin treatment of taro tubers was between 83.81-91.68%. The higher the concentration of maltodextrin added the higher the solubility of instant drinks. This is because there are more free hydroxyl groups, where the free hydroxyl groups are easily bound to water so the solubility of instant drinks is higher. The more free hydroxyl groups in the filler, the higher the solubility of the instant drink produced.

Favorite organoleptic test (Hedonic scale) groove instant drink

Organoleptic tests were carried out to determine the results of the panelists' objective measurements of the sensory attributes of a product. Sensory attributes analyzed in the organoleptic test use the human sense system, including the senses of taste, smell, and sight. The organoleptic test carried out in this study was carried out by 25 panelists using the hedonic method, namely measuring based on the level of preference for color, taste, and aroma with a numerical scale starting from the smallest number to the largest number to determine the number of rankings using the Friedman method.

Based on Table 5. The highest level of preference for the color of the groove instant drink was 6.08 with the treatment of groove leaf extract (1:3) and the addition of 10% maltodextrin. The difference in the color of instant drinks was due to the higher the dilution, the higher the volume of water added, and the higher the concentration of maltodextrin added, the paler the color of the resulting drink. According to Ningtias et al. (2017), the higher the concentration of maltodextrin added, the brighter the color of the instant drink produced. This was because maltodextrin can improve the appearance of the product.

The result of the highest level of taste preference for instant drinks was in the juice treatment (1:3) with the addition of 15% maltodextrin. This was because the groove has a taste that tends to be salty so the higher the groove leaf extract and the higher the concentration of maltodextrin can cover the salty taste. Based on the analysis of the salt content that has been carried out, it

showed that the instant drink in the juice treatment (1:3) and the addition of maltodextrin 15 % had the lowest salt content. According to Pornpitakdamrong and Yuttana (2014), groove leaves have a salty taste, whether consumed fresh or processed first.

Table 5. The average value of the organoleptic test

Treatment		Preference of Ranking Average		
Groove leaf extract	Maltodextrin (%)	Color	taste	Aroma
1 : 1	5	2.82	3.82	4.02
	10	4.04	4.38	4.34
	15	5.88	4.54	4.8
1 : 2	5	4.68	4.38	4.06
	10	5.64	5.32	5.96
	15	5.62	5.64	5.7
1 : 3	5	4.32	4.84	4.74
	10	6.08	5.98	5.92
	15	5.92	6.1	5.22

Note: The higher the value, the more preferred

The results of the panelists' lowest level of preference for the aroma of instant drinks were the treatment with variations in the dilution of groove leaf extract (1:1) with the addition of 5% maltodextrin with a total rank of 100.5. This is because the aroma produced in instant drinks with the (1:1) treatment, the aroma of the groove leaves was more dominant so the panelists do not like it. The groove had a very strong foliage aroma, so the more concentrated the groove leaf extract was added, the more the panelists do not like the aroma.

Conclusion

Groove plants are herbaceous plants that have green and red leaves rich in phenolic compounds with the ability as antioxidants. The potential of this compound and its utilization can be used as an instant drink. The production of instant drinks requires fillers or stabilizers such as maltodextrin. Maltodextrin from taro tubers has the ability as a stabilizer of instant drinks. Groove leaf instant drink with an extract ratio (1:1) and the use of taro maltodextrin 15% had the characteristics of 3.87% water content, 3.75% ash, 0.60% salinity, and 91.95% solubility. The hedonic scale organoleptic value scoring includes color 5.88 (like very much), taste 4.54 (like) and 4.8 (like).

References

Ernawati, U., Lia, U., & Baskara, R. (2014). Pengaruh variasi nilai Dextrose Equivalent (DE) maltodekstrin terhadap karakteristik mikroenkapsulan pewarna alami daun jati *(Tectona Grandis L.). Jurnal Teknologi Pertanian, 15*(2), 111-120.

Husniati. (2009). Studi karakteristik sifat fungsi maltodekstrin dari pati singkong. *Jurnal Riset Industri, 3*(2), 136.

Maulani, A., Adang, F., & Zainuddin. (2012). Pembuatan maltodekstrin dari pati umbi jalar *(Ipomoea batatas.Poir)* sebagai bahan tambahan sediaan farmasi. *Indonesian Journal of Pharmaceutical Science and Technology, 1*(1), 35.

Ningtias, D., Agus, S., & Nurhidajah. (2017). Betakaroten, antioksidan dan mutu hedonik minuman instan labu kuning (*Curcubita moschata Dutch*) berdasarkan konsentrasi maltodekstrin. *Jurnal Pangan dan Gizi, 7*(2), 94-103.

Pornpitakdamrong, A., & Yuttana, S. (2014). Seablite *(Suaeda maritima*) product for cooking, samut songkram Province, Thailand. *Food and Nutrition Sciences, 5*, 850-856.

Oktaviana, Y. R. (2012). Kombinasi konsentrasi maltodekstrin dan suhu pemanasan terhadap kualitas minuman serbuk instan belimbing wuluh *(Averrhoa bilimbi l*). *Skripsi.* Fakultas Teknobiologi. Universitas Atma Jaya. Yogyakarta

Ravikumar, S., Gnanadesigan, M., Inbaneson, S. J., & Kalaiarasi, A. (2011). Hepatoprotective and antioxidant properties of *Suaeda maritima (L)* dumort ethanolic extract on concanavalin-a induced hepatotoxity in rats. Indian Journal of Experimental Biology, 49, 459.

SNI 01-2593-1992. *Syarat mutu dekstrin industri berdasarkan dewan standarisasi nasional.* Jakarta.

SNI 01-7599-2010. *Syarat mutu maltodekstrin berdasarkan dewan standarisasi nasional*. Jakarta.

Sudjaroen, Y. (2015). Evaluation for nutritive values and antioxidant activities of dried seablite *(Suaeda maritima)*. *Scientific Research and Esxsays, 10*(9), 306-312.

Susanti, F. S. (2018). Hidrolisis pati umbi kimpul (Xanthosoma sagittifolium) menjadi maltodekstrin menggunakan enzim A-amilase. *Skripsi.* Teknologi Pangan. Fakultas Teknik. Universitas Pembangunan Nasional. Surabaya.

Syarief, R., & Estiasih, T. (2013). Pemanfaatan talas berdaging umbi kuning *(Colocasia Esculenta (L.)* Schott*)* dalam pembuatan cokies. *Jurnal Pangan dan Agroindustri, 1*(1), 14

Wasmun, H., Abdul, R., & Gatot, S. H. (2016). Pembuatan minuman instan fungsional dari bioaktif pod husk kakao. *E-Jurnal Agrotekbis, 4*(6), 650-658.

Yuliani, S., Desmawarni, Harimurti, N., & Yuliani, S .S. (2007). Pengaruh laju alir umpan dan suhu inlet spray drying pada karakteristik mikrokaspul oleoresin jahe. *Jurnal Pascapanen, 4*(1), 124

Yuliawaty, S. T., & Susanto, W. H. (2015). Pengaruh lama pengeringan dan konsentrasi maltodekstrin terhadap karakteristik fisik kimia dan organoleptik minuman instan daun mengkudu *(Morinda citrifolia L). Jurnal Pangan dan Agroindustri, 3*(1), 41-52.