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Physicochemical Properties of Gelugur Powder (*Garcinia atroviridis*)

Terip Karo-Karo¹, Elisa Julianti^{1,2}, Mimi Nurminah^{1,2*}

¹Department of Food Science and Technology, Faculty of Agriculture, Universitas Sumatera Utara, Medan, Indonesia

²Centre for Tubers and Roots Crop Study, Faculty of Agriculture, Universitas Sumatera Utara, Medan, Indonesia

*Email: miminurminah@usu.ac.id or mimisinaga@yahoo.co.id

Abstract. *Garcinia* fruits (local name *asam gelugur*) are one of endemic species in North Sumatera, Indonesia. In Indonesia, *asam gelugur* have been used for seasoning cook and tea. This study used two factors, the maturity level (T) and drying temperature (S). The result showed that the level of maturity had a very significant effect on water content, total soluble solid, and total acid; had a significant effect on ash content. Drying temperature had a very significant effect on water content, ash content, vitamin C content, total soluble solid, and color score; had a significant effect on total acid. The interaction between the two factors had a very significant effect on total soluble solid. The raw gelugur and drying temperature 50 °C produced the best and more acceptable quality of gelugur powder.

1. Introduction

Garcinia fruits (local name *asam gelugur*), is an endemic species in North of Sumatera Indonesia. In Indonesia, *asam gelugur* have in used for seasoning cook, for tea [1]. The plants have been used as food for centuries [2]. Pharmacological and botanical reports have described the preservative and medicinal properties of *Garcinia* fruits, like strong antimicrobial, antitumour-promoting activities and antioxidant [3–7]. *Garcinia* fruit contain 10-30 % hydroxycitric acid (HCA) 10-30 % [8]. In this research, *Garcinia atroviridis* were used to make gelugur powder. This paper deals with the characteristics of physicochemical of *G. atroviridis* powder (gelugur powder).

2. Methods

The research was conducted at *Analisa Kimia Bahan Pangan* Laboratory, University of North Sumatera. The *Garcinia atroviridis* local varietis were purchased from farmer at Limapuluh, Batubara, Indonesia. Fresh *garcinia* fruits were cut in to flat of slabs 0.2-0.3 mm in thickness. The slabs were oven-dried using cabinet dryer at a temperature of 50°C about 30 hours. The powder was obtained by crushing the dried fruit using steam roller into powder and sieved using a 40 mesh sieve. The powder of *garcinia* was packed in polyethylene plastics, sealed and stored at 28°C.

Analysis consists of water content analysis using oven method [9], ash content analysis using dry ashing method [10], TSS [11], acid content [11] and vitamin C [12]. The best treatment of the test was then compared with the control treatment using T-test. De Garmo was used in determining the best treatment method.



3. Results and Discussion

3.1. Water Content

Ripe gelugur had the highest water content than the raw and half ripe gelugur. It indicated that every level of maturity had different water content. The transformation from raw to ripe on the fruits, like organic content, sugar and carbohydrate can make the higher water content [13]. The higher drying temperature and water vapour [14], the lower of water content of gelugur powder. Drier air temperature will cause material to release water from surface [15].

3.2. Ash Content

The ripe gelugur had the most ash content than the raw and half ripe gelugur. When the time of maturity process happened, the tissue of material would be damaged and some mineral can be shrunk [16]. The higher of drying temperature, the more water content came out, the higher of percentage carbohydrate, protein and mineral, so the ash content would increase [17].

3.3. Soluble Solid Total ($^{\circ}$ Brix)

Soluble Solid Total was influenced by the level of maturity of gelugur, more mature of gelugur more soluble solid total, it indicated that the organic acids change into sugar. Total of the sugar was a dominant component on soluble solid total. The higher drying temperature, the higher soluble solid total will be in gelugur powder. The increase on soluble solid total was caused evaporation water [18]. The more of maturity of gelugur, the higher water content will be. Water content in the fruit can be higher, that was caused remodelling of protopectin to pectin. Pectin is degraded to polygalacturonic acid and water [19].

3.4. Acid Content

Acid content was influenced by the level of maturity of gelugur. The more maturity of gelugur, the lower acid content will be. It showed that organic acid are converted to glucose and fructose [20]. The higher of drying temperature the lower acid content of gelugur powder, that's caused by many damaged organic acids. It indicated some of the volatile compounds evaporated [21].

3.5. Vitamin C

The higher of drying temperature the value of vitamin C decrease, Vitamin C is easily oxidized. Vitamin C oxidation is accelerated by high drying temperature [22]. The process of oxidized is accelerated by heat [23].

3.6. L Value

The higher drying temperature, the lower of L value will be. High temperature and long drying time will cause discoloration and deterioration in quality. When drying time, there has been a Maillard reaction which caused browning [24].

Table 1. Effect of level of maturity on the physicochemical properties of gelugur powder

Parameter	T		
	T ₁ (Raw)	T ₂ (Half ripe)	T ₃ (Ripe)
Water content	5.4302	5.8781	6.1908
Ash content	1.8305	1.8264	1.8164
Total soluble solid ($^{\circ}$ Brix)	57.2778	58.7222	63.0556
Total acid (%)	14.8739	13.1910	11.9257
Vitamin C(mg/100 g bahan)	47.1668	46.7700	45.9193
L Value	77.3624	77.3720	77.7980

Table 2. Effect of drying temperature on the physicochemical properties of gelugur powder

Parameter	S		
	S ₁ (50°C)	S ₂ (60°C)	S ₃ (70°C)
Water content	7.0646	5.7316	4.7029
Ash content	1.8100	1.8162	1.8472
Total soluble solid (°Brix)	58.0556	59.5556	61.4444
Total acid (%)	14.1758	13.0456	12.7691
Vitamin C (mg/100 g bahan)	47.5778	46.9984	45.8242
L Value	77.1213	77.6347	77.7765

Conclusion

The raw gelugur and drying temperature 50 °C produced the best and more acceptable quality of gelugur powder.

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