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Protein Content in Snake Fruit Cultivar Pondoh (*Salacca edulis* Reinw.) with Aseptic Condition in Room Storage

Yulian Dwi Anggraeni Puspa Handoko[1], Ahmad Ni'matullah Al-Baarri[1,2]*, Anang Mohamad Legowo[1], Mulyana Hadipernata[3], Wisnu Broto[3]

[1]Food Technology Department, Faculty of Animal and Agricultural Sciences, Diponegoro University, Semarang, Indonesia
[2]Central Laboratory for Research and Services Diponegoro University (CORES DU), Semarang, Indonesia
[3]Center of Agricultural Post-Harvest Research and Development, Ministry of Agriculture, Bogor, Indonesia

*Corresponding author (albari@live.undip.ac.id)

Abstract

Snake fruit is a type of tropical fruit with high market demand, however it is easily damaged and approximately ± 7 days at room temperature of shelf life. After 3 days of harvest, quality of snake fruit has decrease in chemical components, such as color, hardness, and proximate. The decline in the quality may also be caused by microbial contamination. This study aimed to determine the protein content of snake fruit during storage at room temperature under aseptic condition. This study was done in storage temperature of 25±5°C and carried out at 3 times repetition. The protein content of snake fruit was observed for 3 days. The results showed that protein content of snake fruit at the beginning of storage were about 0.5%. Then, the protein content decreased until undetectable by the Kjeldahl method on the third day of storage. As conclusion, the three days of decrease in the protein content could be determined.

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Introduction

Snake fruit is a type of tropical fruit with a market demand that is always high in demand and in 2017 has reached 953,845 tons (BPS, 2017). Unfortunately, snake fruit cannot be widely distributed because it has a perishable nature and only has shelf life for ± 7 days at room temperature (Pratiwi *et al.*, 2015). The humid and hot tropical climate also causes fresh snake fruit to have a very short shelf life (Palupi *et al.,* 2012). In addition, the fruit begins to show changes in chemical components after the third post-harvest day, such as color, hardness, and proximate which indicates a decline in quality. The low quality of fruit can also be caused by microbial contamination (Hartini, 2014), which increases with the length of storage (Nur, 2012). Microbes need nutrients for life, namely carbon elements in the form of carbohydrates as an energy source and elements of nitrogen in the form of proteins to form cell structures (Indriani *et al.*, 2013). This can support microbial growth and reduce the proximate value of fruit along with the length of storage (Sakti *et al.*, 2016).

Efforts to inhibit snake fruit damage that have been widely carried out were by coating edible fruit. One of them is using the method of an edible coating from chitosan and beeswax on snake fruit. This treatment produces more than 50% damage after being stored 11 days at room temperature and 15 days in cold temperatures because anaerobic respiration caused certain components in snake fruit to turn into alcohol and eventually caused decay (Marlina *et al.*, 2014). The use of acids such as citric acid and benzoic acid is an example that can be used to reduce total microbes in food (Handajanti *et al.*, 2013), but unfortunately, the use of these acids can reduce the sensory quality of fruit (Altunkaya and Gokmen, 2009), although other compound may serve as antifungal, antibacterial and antiviral system (Bafort *et al.*, 2014) without change the taste (Al-Baarri *et al.,* 2016). The quality on snake fruits was also decrease resulting in the change in protein content. Therefore, this study was aim at analyzing the protein content of snake fruit during storage.

Materials and Methods

This study was conducted in October – December 2018 at the Indonesian Center for Agricultural Post-Harvest Research and Development, Ministry of Agriculture, Bogor. The materials were snake fruit (5 months harvest time) that was obtained from Turi, Sleman, Yogyakarta. Snake fruit was keep in the stem, phosphate buffer pH 4 and 7, H_2SO_4, NaOH, boric acid, selenium, bromocresol green methyl red (BCG-MR), HCl. The equipment used during this study was a blender, micropipette, filter cloth, 100 ml Kjeldahl flask, test tube, pipette, burette, spatula, distiller, and centrifuge.

Snake Fruit Preparation

Snake fruit preparation refers to the method carried out by Sabarisman *et al.* (2015). Snake fruit was sorted based on the presence or absence of bruises, flaky skin, and decay. Then snake fruit and the container were cleaned from sticking dirt using an aseptic cloth. The preparation process was carried out using latex gloves and aseptic rooms to minimize contaminated fruit.

Analysis of Protein Content

Protein content was analyzed every three days using the Kjeldahl method based on Elfita (2014). Snake fruit that was weighed as much as 0.5 g, added with 2 g of selenium and 25 ml of concentrated H_2SO_4, then put in a 100 ml Kjeldahl flask. The destruction process is carried out until the solution becomes clear greenish. After cool, then put in a 100 ml volumetric flask and diluted with distilled water to the boundary mark. As much as 5 ml of 30% NaOH was put into a distillation flask, then distilled for 5 minutes. The distillate was accommodated as much as 10 ml with 2% boric acid and BCG-MR indicator. The amount of reacted boric acid with ammonia could be identified by 0.01 HCl titration. The end of the titration was marked by a change in the color of the solution from blue to pink. Protein content was calculated by the following formula as mentioned in previous method (Elfita, 2014).

Results and Discussion

The protein content of snake fruit was tested using the Kjeldahl method from day 0 to determine the fruit protein content at the beginning of storage. The results of the analysis showed that the protein content of snake fruit at the beginning of storage was about 0.5%. Generally, fruits contain very low protein levels (Setyawati *et al.,* 2013), such as in 100 g of snake fruit which only contains 0.4 g of protein (Hakim and Setiawan, 2014). The chemical composition of fruit is influenced by several factors, including genetic factors, growing environment, and harvest age or level of maturity.

Subsequent analysis conducted on the third day showed the result of the protein destruction on all samples. The results of the distillate should change color because, during the distillation process, ammonia was bound to boric acid for generation of ammonium borate (Makiyah *et al.,* 2015). Unchanged distillate color might be due to a remarkable decrease in protein content (Astuti *et al.,* 2016). Protein content as nutrients and nitrogen sources for microbes are used for metabolism and microbial growth (Masfufah *et al.,* 2015). Therefore, the protein content of snake fruit decreased during storage. Decrease in protein were also part of macromolecular degradation that occurs along with fruit aging (Li *et al.,* 2015).

Protein in food can be analyzed by various methods such as the Kjeldahl, Lowry, Bradford, and Biuret methods. This study used Kjeldahl method as the most commonly used method and cheap but required a long time process (Dewi *et al.,* 2016). Similar to the analysis of the levels of “Kasturi” protein (Antarlina, 2009) and “Cempedak” fruit (Arif *et al.,* 2014) resulting the protein were about 1.07%. Unfortunately, the Kjeldahl method has a detection limit that also depends on the device that may various capability of detection limit (Bakhtra *et al.,* 2017).

Conclusion

The protein content of snake fruit was tested using the Kjeldahl method to produce protein levels was about 0,5% at the beginning of storage. Then, the protein content in snake fruit decreased until it could not be detected by the Kjeldahl method on the third day of storage, so the analysis could not be performed.

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