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SOURSOP FRUIT POTENTIAL AS A SUBSTRATE IN NATA DE ANONNA PRODUCTION

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ABSTRACT

Nata is a functional food that has an healthy effect because it contains vitamin C. Vitamin C is beneficial for the body. Nata derived from soursop fruit called nata de anonna, which is produced from the bacterial activity of *Acetobacter xylinum*. This study aimed to determine the potential of soursop fruit skin as a substrate for making nata de anonna. The research study show that the yield of nata from soursop fruit, soursop skin, and soursop pulp were 1.5 cm, 1 cm and 0.8 cm. This research concluded that the hump and soursop skin which become waste are part of the soursop fruit can be used as the substrate of nata de anonna.

Keywords: Soursop, nata de anonna, substrate

INTRODUCTION

Soursop *(Annonamuricata L)* is a species of tropical fruit tree that belongs to the family Annonaceae. The Annonaceae family has about 119 species (Ross and Victor 2010). Soursop is a fruit plant that is very popular and is also widely known by the public. This plant has amazing benefits for body health, so many are cultivating this plant. According to Prasetyorini (2014) the soursop (Annonamuricata L) received a lot of attention from the community because of the news about its efficacy in killing cancer cells. Generally, the use of soursop fruit in Serang still need to improve. Nowadays, soursop fruit is used as a dish in the form of soursop ice, juice, and syrup.

Pulp is the part of soursop fruit commonly used. The skin and the hump soursop are rarely used and are often disposed of as waste. According to Bora (2014), soursop has high polyphenol compounds, and contains lots of vitamin C. Phenol and flavonoid compounds in many plants act as antioxidants because they have molecular structures that provide electrons to free radical molecules.

Nata is a gel-like substance, insoluble in water and formed on the surface of fermentation. Nata de coco is a type of nata that used coconut water as media. While nata de annona is a type of nata that used soursop fruit extract as media. Nata is rich of dietary fiber (Priyanto, 2011).

Acoording to (Hamad et al., 2017) Pineapple skin as a substrate of nata de pina is very potential. Pineapple skin is usually disposed as waste. Although, it shows great potency as raw material of functional food. This indicate by the high yield of 80.24% nata de pina, 1.11 cm thick and the high moisture content of 89%. This parameters showed the similarity of nata de coco and nata de pina.

Nata de annona made from soursop substrate. However, it is not clear which parts have the best potential to be used as substrate for nata de annona. The skin and the humps is by product of soursop and usually dispose as waste. But, the skin and the hump is potential as a substrate for nata de annona. This research

was conducted to determine the potential of soursop skin and humps as a substrate of nata de anonna.

MATERIALS AND METHODS

Tools and Materials

The materials used in this study were soursop fruit (*Annonamuricata* L), granulated sugar (carbon source), urea (nitrogen source, and glacial acetic acid ± 96%, mineral water. Experiments carried out by comparing the part of soursop fruit as a substrate of nata de annona. Soursop fruit parts are skin, pulp, and hump The tools used in the study consisted of analytical scales, cooking pans, vegetable spoons/tablespoons (stirrers), filters, washcloths, gas stoves, plastic basins, plastic trays with a minimum height of 5 cm, rubber bands, newspaper, pH meters, thermometers, glassware (Hamad *et al.*, 2017).

Methods

The stages of the research carried out can be seen in Figure 1.as follows:

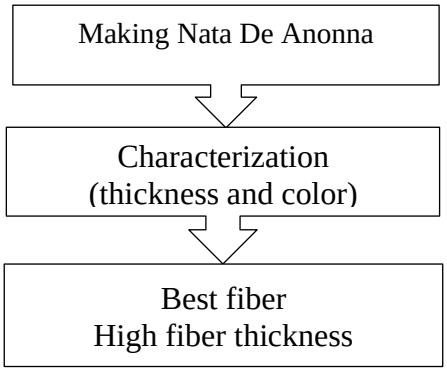


Figure 1. Steps of research

The stages of making nata de anona are as follows:

Soursop Media Preparation

Soursop part was separated from the skin and pulp. the soursop part is mixed with water in a ratio of 1: 2 then blended and then separated with the pulp. As much as 500 ml of water was sterilized by boiling until boiling. (simmer for 5 minutes). Pour the boiled mixture into a 20x30x5 cm sterile plastic pan with a minimum height of 5 cm, then cover tightly with newspaper and let it sit a day until it is completely cold (Endria et al., 2008).

Seeds Adding and Storage

The media consisted of 17.5 kg of sugar as carbon substrate, 3 kg of urea as a nitrogen source and Glacial acetic acid (vinegar) as much as 20 ml to adjust the pH to 4.5. The culture liquid was put in a 20 x 30 x 5 cm plastic baking pan as fermentation place. The nata starter, 60 ml of Acetobacterxylinum, was put into the culture liquid in a sterile condition. The culture was stored for 9 days in a cool and safe place (undisturbed and not rocking).

Harvesting

Soursop water media (skin, hump, and pulp) that have formed nata de anona hydrogel fibers (pellicles) were washed and cleaned using flow water until the acid disappears. Nata de anonna colors was clear white. The cleaning process was done to relieve the smelly and rotten product due to the fungus growth. The cleaned nata de anonna was cut into dice form.

RESULTS AND DISCUSSION

Nata de anonna is a type of nata that in its making uses soursop as a substrate. Soursop fruit is quite easy to find, so people are familiar with this fruit. All parts of soursop plants such as fruit, leaves, seeds, and stems can be used for health because they contain antioxidants, anticancer, and antiviral (Wullur et al., 2012). Every 100 g of edible soursop contains 0.07 mg of B vitamin, 20 mg of vitamin C, 2.54% sucrose, 5.05% dextrose and 0.04% levulose (Sukarmin, 2010). The content of vitamin C is very good for the body because it functions as an antioxidant. Antioxidants are very good for increasing endurance (Hermawan and Leksono, 2013).

To produce solid, thick, supple, and translucent nata masses, it is important to consider the temperature of incubation (fermentation), composition and pH or acidity of the medium, besides the use of a starter (starter) is also important (Rizal, 2013).

Growth of Nata Layer Thickness

The growth of nata with variations substrate of the soursop (skin, pulp and hump) in can be seen in Table 1.

Table 1. Nata layer thickness produced from the soursop section

No.	Part of soursop	Layer thickness(cm)
1.	Pulp	0.8
2.	Hump	1.5
3.	Skin	1

Nata de anonna from soursop hump is thicker than nata de anoona from soursop skin

and soursop pulp. It is 15 mm. The thickness of nata from fruit pulp has the lowest thickness of only 8 mm. The difference in thickness shows that ,as a substrate, the soursop corm has a higher carbohydrate content than the other parts. The pulp part has a high moisture content, while the skin is the hard part. Soursop fruit contains numbers of vitamins and fiber.The vitamins contained was A, B, and C. In addition soursop fruit also contains 2.54% sucrose, dextrose 5.05% and 0.04% levulose (Radi, 1997).

Based on the results (Table 1), the thickness diferencess indicate that there is an interaction between Acetobacterxylinum and the different substrates. The thicknest got from the hump substrates. It means that the interaction of bacteria with the substrate and other ingredients have a good interaction. According to Effendi et al., (2011) the thickness of the nata layer is influenced by the sucrose content in the liquid substrate media. The high of the sucrose content in the water substrate media corelate the high of the thickness of the nata layer. The addition of sugar to the media is useful as a food source for the growth of Acetobacterxylinum to produce layer of cellulose (nata) through the fermentation process (Malvanie et al., 2014).

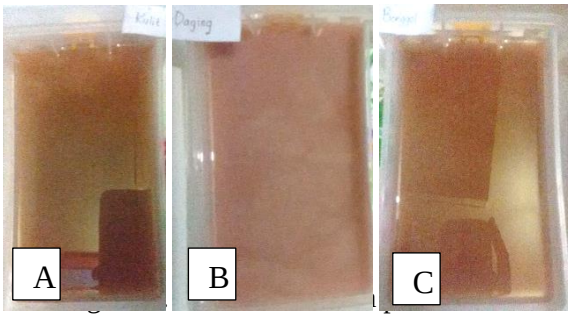
Nurhayati (2005) said that seven-day fermentation provides sufficient nutritional and oxygen aeration requirements, this caused an increase in the number of bacterial cells and making the cellulose layer heavier. In addition, in the fermentation process, the dynamics of the growing population of Acetobacterxylinum bacteria are difficult to predict. This happens due to environmental conditions that cannot be controlled properly during the fermentation process. According to Suparti (2007) nata thickness is also influenced by the age of the bacteria. The age of the bacteria affects the final result, the older the culture used, the lower the yield (thickness) in the fermentation.

Acetobacterxylinum is a cell that produces cellulose or microbial cellulose. These bacteria are gram negative, aerobic, and can produce cellulose (Malvanie et al., 2014). Acetobacterxylinum synthesizes and produces the cellulose fibrils that come out of the pores of the cell membrane. During the fermentation process, the cellulose will bind other cellulose to form layers or pellicles. This layer will float on the surface of the media so that oxygen can diffuse into the media. Oxygen is needed for the growth, development and formation of cellulose pellicles (Hamad et al., 2017).

The layer or pellicle is often referred as nata. Nata is an extracellular polysaccharide layer (cellulose) formed by capsule-forming microbes. This layer has a rubbery texture, resembles a gel and floats on the surface of the liquid (Iguchi et al., 2000). The growth of Acetobacterxylinum is influenced by several factors including nutrient content including the amount of carbon and nitrogen, the acidity level (pH), temperature, and air (Malvanie et al., 2014). These factors support the bacteria to grow, develop and produce a layer of cellulose.

Color

The results of color analysis of the nata products produced can be seen in Figure 2.



According to the result study, it is known that the color of the skin, pulp, and hump substrate have almost the same color, namely brown. However, the three different substrate have different color. Nata also has a color that is not much different, namely white with a little murky. The most visible nata color is rather white found on the hump soursop. This is influenced by the amount of glucose contained in the substrate. According to (Edria et al., 2008) the color of nata is influenced by the interaction of sucrose with nutrients in mineral water, many interactions between sucrose and nutrients make the color of nata not bright (less white).

In the soursop hump, there is a natural sugar compound so that the mixing of sugar and substrate produce high glucose content. It also generate caramelization because of boiling process. This will affect the color of the resulting nata. Based on Figure 1, it shows that the nata color of the skin, pulp, and hump soursops substrate were not significantly

different, showing almost the same color. The texture produced on the skin is slightly hard, the hump produce soft texture, and the pulp has a soft texture.

CONCLUSION

This research can be concluded that soursop hump and soursop skin which are usually disposed of as waste have the greatest potential in making nata de anona. Nata de anona thickness produced from soursop skin produces nata which has a thickness of 1.12 cm with a slightly hard texture, 0.74 cm hump with a soft texture and 0.20 cm pulp with a soft texture. Part of soursop meat contains most of the water which has smaller nutrients than other parts so that it produces thin nata. This parameter shows that all parts of soursop fruit can be processed for making nata de anonna

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