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RESEARCH ARTICLE

"ADDITION OF SUCROSE IN MAKING NATA DE COCO WITH ROSELLA EXTRACT (HIBISCUSS SABDARIFA L.)"

Diana Sylvi[1], Rifma Eliyasmi[1] and Elfa Susanti Thamrin[2]

1. Lecture of Agricultural Product Technology.
2. Student of Agricultural Product Technology.

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Abstract

This research aim to determine the effect of giving sucrose with different concentrations on the characteristic of nata produced and to determine the best addition of sucrose concentration. The raw materials used in this study were roselle petals and coconut water. The treatment in this study was sucrose which was added as a carbon source of Acetobacterxylinum with a combination of treatments being 4%, 6%, 8%, and 10%. This study used Completely Randomized Design (CRD) with 3 replications. The result showed that in the initial fermentation medium, the sucrose concentration had no significant effect on the initial pH of fermentation but had a significant effect on sugar content. In the resulting nata de coco, the sucrose concentration had no significant effect on thickness, weight, yield, vitamin C levels, and organolepic values but had a significant effect on crude fiber content. Sucrose treatment with 8% concentration produced the best product with a pH initial of fermentation 4.21, sugar content 10.20 ^{0}Brix, 81.16 thick, 400 g weight, 80% yield, 11.29 mg/100g vitamin C content, 1.36% crude fiber content, and organoleptically preferred.

Introduction:-

Functional food is food or food materials that has additional benefits besides the basic nutritional function of food so that it can have a positive impact on the function of human metabolism. Indonesia has various kind of nutritious and useful commodities, Roselle is one of them. The content of nutrients such as anthocyanins, carbohydrates, proteins, fats, ascorbic acid, and other nutritional content is quite good and also roselle flowers can act as natural dyes so that rosella is suitable as an ingredients used in the manufacture of drink, fruit juices, syrups, and other products. The benefits of rosella flowers are quite a lot and because rosella is still not widely applied to food, therefore a diversified product made from roselle is made in the manufacture of nata de coco.Nata de coco product can be used as functionalfood for dietary purposes and to improve the digestive process because it is a source of dietary fiber and plays a role in the prevention of colon cancer. Sucrose acts as an energy source and carbon source for Acetobacterxylinum to grow and develop. This compound is indispensable in the synthesis of cellulose which eventually forms the nata layer. If the addition of sucrose incorrect, it will cause the resulting product to be not optimal. Based on this background, a study was conducted on **"Addition of Sucrose in Making Nata de Coco with Rosella Extract (Hibiscuss sabdariffa L.)"**

Corresponding Author:- Diana Sylvi
Address:- Lecture of Agricultural Product Technology.

Materials And Methods:-

Materials:

Rosella flower petals, coconut water, Acetobacterxylinum culture, sugar, water, ZA (Ammonium Sulfate), alcohol, iodine 0.01 N, starch indicator, concentrated H_2SO_4, NaOH, K_2SO_4, 95% alcohol, and distilled water.

Research Design:

The research design used a completely randomized design (CRD) with 4 treatments and 3 replications. The data obtained were processed using variance and continued with Dunchan's Multiple Range Test (DNMRT) at the 5% real level.

Table 1:- The Formula for Making Nata de Coco with Rosella Extract.

No	Ingredients	Total	Ingredients	Total
1	Roselle Petals (g)	4	ZA(%)	0,6
2	Roselle Extract (ml)	250	Sucrose (%)	4, 6, 8, 10
3	Coconut Water (g)	250	Starter	10

Methods:-

Making Rosella Medium:

Rosella extract is obtained by soaking 4 grams of flower petals by adding 1 L of hot water (1:250). After that, the flower petal extracts is filtered using a tea filter.

Making Starter (Modified from Hidayat, 2006):

Put 500 ml of rosella extract and 500 ml of coconut water in a saucepan, the boil it until it boils. Add 0,6% ZA and 6.5% granulated sugar, then stir until dissolved and let it simmer for 10 minuted. Remove and place into several 500 ml wide-mouthed bottles and cover with sterilized newspaper. The fermentation medium solution is cooled to room temperature ($\pm 30^0$C) and after it cools down, put the 10% starter by opening the bottle cap a little, then pouring it directly near the fire, then closing it again. Fermentation for 5 days.

Making Nata (Modified from Hidayat, 2006):

Put rosella extract and coconut water in a saucepan, then boiled until it boils. Add 0.6% ZA and sugar according to the treatment (granulated sugar 4%, 6%, 8%, and 10%). Stir it until dissolves and let it boil for 10 minutes. The fermentation media solution is removed and then put in a tray, covered with sterilized newspaper. The solution of the fermentation medium is cooled to room temperature ($\pm 30^0$C) and after it has cooled down, put 10% starter by opening the bottle cap a little, then pouring it directly near the fire, then closing it again. Fermentation for 10 days in a sterile room and ready to be harvested.

Results and Discussions:-

Observations made on nata de coco with rosella exract were the initial pH of fermentation medium, sugar content, thickness, weight, yield, vitamin C content, crude fiber content, and organoleptic test consisting of texture, color, aroma, and taste.

Fermentation Medium:

Based on results of research on fermentation medium and sugar content were obtained as shown in Table 2.

Table 2:- Result of Analysis Nata de Coco Fermentation Media with Rosella Extract.

Treatment	The Initial pH of Medium	Sugar Level (^{0}Brix)
A (4% sucrose)	3.74	7.07 b
B (6% sucrose)	4.00	9.97 a
C (8% sucrose)	4.21	10.20 a
D (10% sucrose)	4.10	11.20 a
Coefficient of Diversity	**7.39%**	**10.11%**

Based on the results of the study, the pH value ranged from 3.74 to 4.21. This shows that the media has met the requirements for the growth of Acetobacterxylinum so that it can form nata. According to Sutarminingsih (2004), nata formation activity only occurs in the pH range 3.5 - 7.5.

Based on Table 2, it can be seen that the initial sugar content of nata media fermentation ranges from 7.07-11.2 ^{0}Brix. The addition of sucrose concentration in the range of 4% - 10% fulfills the requirements for Acetobacterxylinum to form nata because the energy to synthesize cellulose bands comes from the overhaul of sucrose.

The Resulting Nata:
Based on the results of research on the nata produced, the thickness, weight, yield, vitamin C content, and crude fiber content were obtained as shown in Table 3.

Table 3:- Result of Analysis of Nata de Coco with Rosella Extract.

Treatment	Thick (mm)	Weight (g)	Yield (%)	Vitamin C Levels (mg/100g)	Crude Fiber Content (%)
A(4%sucrose)	71.50	350.00	70.00	11.25	11.55 a b
B (6% sucrose)	77.16	361.67	72.33	10.93	1.84 a
C (8% sucrose)	81.16	400.00	80.00	11.29	1.36 a b
D(10% sucrose)	79.00	383.33	76.67	9.97	1.20 b
Coefficient of Diversity	**10.38%**	**7.50%**	**7.50%**	**10.88%**	**7.99%**

Based on Table 3, it can be seen that there is an increase in nata weight due to the higher concentration of sucrose, the greater the availability of energy sources and carbon sources for Acetobacterxylinum in the fermentation medium to produce cellulose. This is in line with the thickness of the nata, where the thicker the nata obtained, the haviernata produced. The optimum condition for bacterial growth is the addition of 8% sucrose because at 10% sucrose concentration the results obtained are decrease.

The yield increase is in line with the increase in the weight of the nata produced. The yield increased with the increasing the concentration of sucrose added, but after reaching the optimum point, the addition of higher sucrose actually decreases the yield value.

Based on table 3, it can be seen that vitamin C nata levels range from 9.67mg/100g - 11.29mg/100g. according to Sutarminingsih (2004) nata contains about 98% water, 0.2% fat, 0.012% calcium, 0.002% phosphorus, and 0.017% vitamin B_3, with a slightly chewy texture solid, sturdy, white, and transparent. In general, nata doesn't contain the vitamin C needed by the body. The fermentation medium is made from a combination of coconut water and brewed roselle, where roselle contains high enough vitamin C so that the remaining vitamin C content in the nata is analyzed.

Based on Table 3, it can be seen that the crude fiber content of nata ranges from 1.20% - 1.84%. Acetobacterxylinum will produce extracellular cellolose if the growth medium contains sufficient nutrients. The relationship between cellulose and nata produced can be seen from the thickness and weight obtained. However, in the analysis of crude fiber content, treatment B is the optimum point in producing the highest fiber content. This is not in line with the thickness and weight values obtained, where C treatment is the optimum point in producing the highest thickness and weight, because in treatment C more water is trapped in its cellulose structure.

Organoleptic Value:
Based on the research result, it can be obtained a radar graph of the organoleptic values as shown in Figure 1. From Figure 1 it is found that the treatment with the addition of 8% sucrose is preferred organoleptically by the anelistsinterms of color, taste, aroma, and texture. Where the color is 4.20, taste 4.20, aroma 3.80, and texture 3.80.

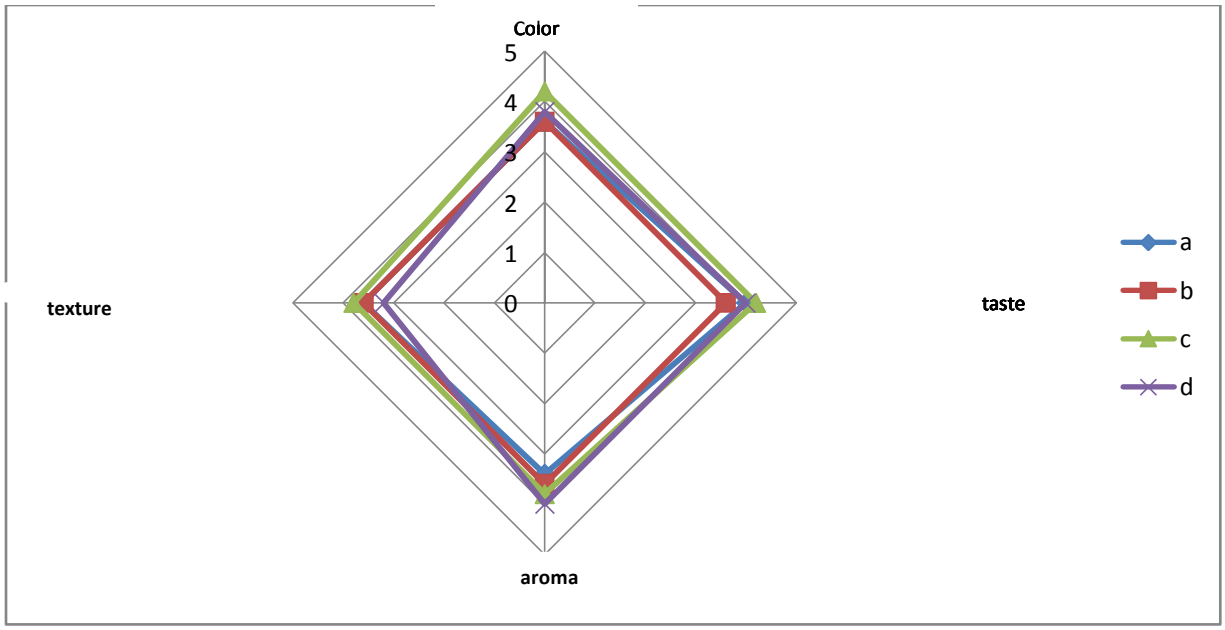

Figure 1:- Radar Graph of Organoleptic Assessment Results.

Conclusion:-

Based on the results of the study, it can be concluded that the addition of sucrose affects sugar content and crude fiber content but doesn't affect the initial pH of the fermentation medium, thickness, weight, yield, vitamin C content, and organoleptic value. Nata as a functional food contains crude fiber content between 1.20-1.84% and vitamin C levels between 9.97-11.29mg/100g. the organoleptic test results on the texture, color, aroma, and taste of nata de cocorosella were accepted by the panelist.

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