The Properties of Nutmeg Jam:
Proportion of Cane sugar, Coconut sugar and Pineapple

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ABSTRACT
Flesh of nutmeg is the biggest part of the fruit that is 80%, but few have been utilization. Nutmeg hours is an alternative utilization of nutmeg flesh. smearedand less preferred is obstruction in processing nutmeg hours. Substitution coconut sugar and addition of pineapple is one of the strategy to improve smeared and taste. The aims of the research were to 1) Determine the Appropriate proportion between cane sugar and coconut sugar to produce nutmeg clock with Easily smeared and preferred; 2) Determine the Appropriate proportion between nutmeg and pineapple in order to get the result of nutmeg hours with yellowish brown colorand preferred; 3) Determine the best combination to produce nutmeg hour treatment with yellowish brown color, strong aroma of nutmeg, easily smeared and preferred. The result Showed that 1) Proportion of cane sugar with coconut sugar 25: 75to produce nutmeg jamwith Easily smeared (scale of 3.17), and preferred (scale of 3.33). 2) Proportion of nutmegwith pineapple 7: 3to produce nutmeg hours with dark brown color (scale of 1.1) andpreferred (scale of 3.33). 3) combination treatment of cane sugar with coconut sugar and nutmegwith 25:75 pineapple 7: 3to produce the best nutmeg hours with dark brown color (scale of 1.1), the aroma of nutmeg rather strong (scale of 2.20), easily smeared (scale of 3.17) danpreferred (scale of 3.33).
***Key words**: Cane sugar, coconut sugar, nutmeg, nutmeg hours, pineapple*

Nutmeg (Myristica fragrans Houtt) is plant originally from Indonesia. Production of nutmeg in Indonesia increased every year. Based on data from the Directorate General Plantation (2006) regarding the production of nutmeg 2000 to 2005 ranged between 20,010 -23,600 tons, while the total area of 59,500 - 74 700 ha. According to Rismunandar (1990), fruit nutmeg fresh could be produced fruit flesh as much as 77.8%; Fulli as much as 4%; shell seed as much as 15.1% and 13.1% total seed meat. Meat nutmeg is the biggest part of fresh nutmeg fruit is 77.8% but only a small fraction has been utilized and largely discarded as agricultural waste. Meat nutmeg potential to be processed into a variety of food products such as candied nutmeg, nutmeg syrup, jam, and dodol. Besides these products, meat nutmeg can be processed into juice mace, nutmeg instant drinks, jelly nutmeg, mace wine, vinegar, gelatin candies and hard candy.

Alternative utilization of nutmeg is processing meat into jam. Nutmeg jam is one of the processed foods of nutmeg
which has the potential to be developed. Nutmeg meat processing into jams is an effort to increase the use value. Meat nutmeg which initially lacked the economic value after processed into processed food products will have high economic value. Besides, it would open up jobs for the community.

Factors important in the manufacture of butter, among others, sugar, pectin and acid. In the jam-making generally use sugar as a source of sugar. The use of sugar in the manufacture of jam affecting less topical subtle nutmeg butter so hard to be applied, so the need adannya use sugar sources other than sugar, namely coconut sugar. According to Santoso (1988), coconut sugar has a compact texture and structure and not too loud so easily broken and leave a soft impression. Their use of palm sugar in jam making is expected to improve topical jam generated power.

Coconut sugar can also contribute to the taste and flavor of jam thus increasing preference level nutmeg jam. Based on the results Nurhayati (1996), the flavor of coconut sugar is affected by the volatile components, especially components such heterocyclic pyrazines and furans generated in the manufacture of palm sugar. Coconut sugar has a sweet taste with a slightly sour taste. Sour taste due to the content of organic acids in it. Organic acids cause the coconut sugar has a distinctive aroma, slightly acidic and smelling caramel. Caramel flavor in the coconut sugar caramelization reactions caused by heat during cooking ..

Meat nutmeg has astringent and bitter taste which is caused by the presence of high levels of tannins that will have an impact on other dairy products. According Fidriany et al. (2004) that the tannin content in meat nutmeg ranging from 12.34% - 15.30%. Attempts to mask the taste astringent and bitter which combine nutmeg with other fruit that has a sharp flavor, such as pineapple. Pineapple has a sweet to slightly acid that gives a fresh taste that use pineapples in the manufacture of nutmeg butter is expected to cover the taste astringent and bitter posed by the nutmeg flesh that can increase the joy or acceptance of the jam produced. other than that
Extra pineapple contribute to the improvement of pectin.

Based on this background can be formulated several problems that when the use of the proportion of coconut sugar is too high will cause a jam resulting product is too soft and instead use the proportion of palm sugar that is too low will cause the jam produced hard and difficult to be applied. The proportion of the use of pineapple is too high causing the resulting nutmeg aroma is not felt and if the use of pineapple is too low causing the jam nutmeg produced has a bitter and astringent taste is strong. Therefore, in this study sought appropriate proportion, between sugar with palm sugar as well as between meat nutmeg with pineapple, resulting in a jam nutmeg with good characteristics.

The purpose of this study were: 1) to determine the right proportion between sugar with palm sugar to produce nutmeg butter with jam easily applied and preferred; 2) determining the proper proportions between meat nutmeg with nutmeg jam pineapple so produced with a yellowish brown color and are favored; 3) determine the best treatment combination to produce nutmeg butter with nutmeg aroma is strong, easily applied and preferably

RESEARCH METHODS

1. Materials and Devices

The materials used in this study is the meat nutmeg, sugar, citric acid, pineapple, salt solution to reduce the astringent taste. Chemicals PA (Pro Analysis) which is used among other things: NaOH 1%. Sugar used in this study consisted of sugar "Gulaku" and coconut sugar obtained Somagede Kemawi village sub-district of Banyumas.

The tools used in the manufacture of jam nutmeg is the scales, blenders, Gekas instruments, basins, pans, spatulas, gas stove, jars, label paper, pH paper and equipment laboratarium for chemical analysis as an analytical balance (AND), digital scales (Ohaus), centrifuge (Hettich eba 20 zentrifugen), oven (mammert 854 schabach), desiccator, waterbath (Memmert), cooling behind, test tubes (pyrex), measuring cups (pyrex), a flask (pyrex), spatula, and pipette (pyrex).

2. Making jam nutmeg

Raw materials nutmeg steamed with steam blanching method for 15 minutes aiming to prevent enzymatic browning. Stripping of raw materials intended for separating meat and skin nutmeg nutmeg. Immersion in saline solution (2.5%) for 12 hours which aims to reduce levels of tannins in meat nutmeg. Laundering, aims to remove debris left behind during the stripping of raw materials. Destructed raw materials that aim to reduce the size of the fruit and produce jam with a smooth texture. Mixing materials such as pulp nutmeg, pureed pineapple and sugar. Cooking is done at a temperature of 105-110^{o}C and stirred continuously. The addition of 50% citric acid solution which aims to lower the pH. Stirring for 10 minutes then remove and set aside.

3. The trial protocol

This study uses an experimental study with two factors tested, namely the proportion of coconut sugar with sugar consisting of five levels ie 100: 0 (G1);

75:25 (G2); 50:50 (G3); 25:75 (G4); 0: 100 (G5) and the proportion of meat nutmeg with pineapple which consists of three levels, namely 9: 1 (N1); 8: 2 (N2); 7: 3 (N3) .Rancangan experiments used in this study is a randomized block design (RBD) arranged as factorial in order to obtain 15 combined treatment. Each treatment was repeated 2 times thus obtained 30 experimental units. The variables measured variable chemical and sensory variables. Chemical variables include moisture content and pectin content. Sensory variables include color, power topical, the aroma of nutmeg and kesukaan.Data chemical variables were analyzed using analysis of variance (F test) at confidence level (level of confidence) 95% (α = 5%), if it shows the real effect followed by Duncan's multiple range test "s (Duncan's Multiple Range Test) with a 95% confidence level to determine whether there is a significant difference between the level of treatment. Organoleptic Data were analyzed using Friedman's analysis with a confidence level of 95%, if it shows the real effect continued with multiple comparative test.

RESULTS AND DISCUSSION 1. Water content

Results of analysis of variance showed that the proportion of sugar with palm sugar (G) very significant effect on the water content of butter nutmeg. The water content in the treatment of G1, G2, G3, G4 and G5 respectively - helped ie 26.57%; 29.22%; 31.10%; 31.73% and 33.69% (Figure 1).

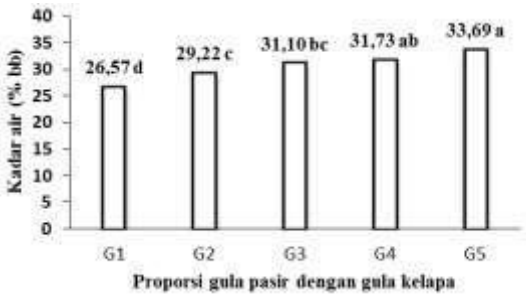
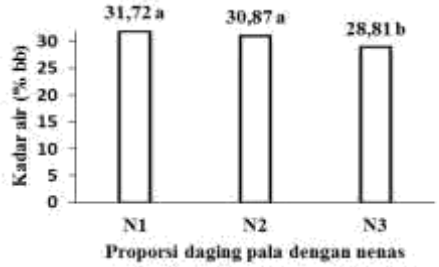


Figure 1. The water content of butter nutmeg in various proportions of sugar with palm sugar.

Figures followed by the same letter show no significant difference in the level of 5% DMRT.

The results showed that the higher the proportion of palm sugar used in the manufacture of butter nutmeg nutmeg jam then the water levels higher. This caused the water content of coconut sugar is higher than the sugar. According to Santoso (1993), the water content is 10% palm sugar and coconut sugar quality according to SNI (SNI 01-3743-1995) that the water content up to 10% of palm sugar, while the water content of sugar by 5.4% (Hardinsyah and Briawan, 2000).

Results of analysis of variance showed that the proportion of meat nutmeg with pineapple (N) very significant effect on the water content of butter nutmeg. The water content of butter nutmeg on treatment N1, N2 and N3 respectively - helped ie 31.72%; 30.87% and 28.81%. Duncan Multiple test results showed that the water content was not significantly different N1 N2 treatment but significantly different with N3 treatment. The average value of the water content in the variation of the proportion of butter nutmeg nutmeg meat with pineapple (N) is presented in Figure 2.



Gambar2. The water content in various proportions jam nutmeg nutmeg meat with pineapple. Figures followed by the same letter show no significant difference in the level of 5% DMRT

The results showed that the higher the proportion of pineapple are added causes the water content of butter nutmeg decreases. That is because that pineapple fiber content is higher than the meat nutmeg. In the analysis of raw materials where the pineapple fiber content 17.089% (bk) while the meat nutmeg 6.353% (bk). Crude fiber content will inhibit the absorption of water which will result in decreased water levels nutmeg jam. According to Buckle et al. (2004) that more and more cellulose then trapped water gets smaller resulting in water levels dropped. Tillman et al. (1986) say that the fiber contains cellulose, lignin, some and other polysaccharide.

2. The content of pectin

Pectin is a substance that thickens jams. Based on the analysis of variability in the proportion of sugar with palm sugar

(G) no significant effect on levels of pectin jam nutmeg. Nutmeg jam pectin levels in the treatment of G1, G2, G3, G4 and G5 are 2.48%, 3.11%, 3.27%, 2.65% and 2.88%. The proportion of sugar with palm sugar is not having an effect on levels of pectin real nutmeg jam, it was because of sugar with palm sugar contains no sugar and pectin that coconut sugar does not contribute to the levels of pectin jam nutmeg.

Results of analysis of variance showed that the proportion of meat nutmeg with pineapple (N) has significant effect on levels of pectin jam nutmeg. Nutmeg teselai pectin levels in treatment N1, N2 and N3 respectively - helped ie 2.29%, 2.98% and 3.35%.

Results DMRT pectin levels indicate that treatment was not significantly different N1 N2 but significantly different from the N3. The treatment was not significantly different N2 N3. The average value of nutmeg jam pectin content in the variation of the proportion of meat nutmeg with pineapple (N) is presented in Figure 3.

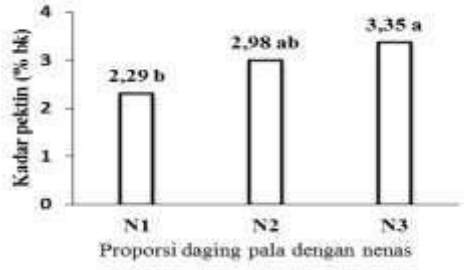


Figure 3. Levels of nutmeg jam pectin at various proportions of meat nutmeg with pineapple. Figures followed by the same letter show no significant difference in the level of 5% DMRT

The results showed that increasing the proportion of pineapple, nutmeg jam pectin content increased. An increasing proportion will increase levels of pectin pineapple jam nutmeg. This is due to differences in pectin content in meat nutmeg and pineapple pineapples which have a higher pectin content than meat nutmeg. In the analysis of the raw material pectin levels in meat nutmeg

approximately 1.080% bk while pectin in pineapple approximately 5.121% bk.

3. Color

Color is an attribute which, together with the flavor and texture is an important factor in the acceptance of food. Color can also provide an indication of chemical changes that occur in foods during heating, such as the formation of brown and caramelize (de Man, 1997).

Friedman test results showed that the combination treatment between the proportion of sugar with palm sugar (G) and the proportion of meat nutmeg with pineapple (N) very significant effect on the color of nutmeg jam. Nutmeg butter color values ranged from 1.1 dark brown (dark brown) to 3.9 (tawny). The influence of the proportion of sugar with palm sugar (G) and the proportion of meat nutmeg with pineapple (N) to the color of nutmeg butter is presented in Figure 4.

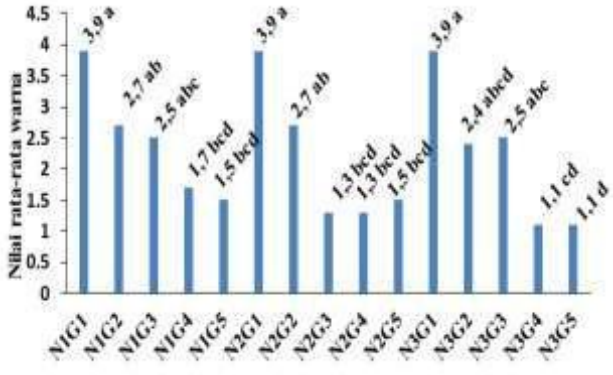


Figure 4. The color values on jam nutmeg in various combinations of treatments

N1 = proportion of meat nutmeg with pineapple (9: 1); N2 = the proportion of meat nutmeg with pineapple (8: 2); N3 = proportion of meat nutmeg with pineapple (7: 3); G1 = the proportion of sugar with palm sugar (100: 0); G2 = the proportion of sugar with palm sugar (75:25); G3 = proportion of sugar with palm sugar (50:50); G4 = proportion with the granulated sugar palm sugar (25:75); G5 = proportion of sugar with palm sugar (0: 100)

Combination treatment N1G1, N2G1 and N3G1 has a value of 3.9 is the highest color tawny, while the lowest value in the combination treatment and N3G5 N3G4 of 1.1 which is dark brown. The resulting high value indicates better color nutmeg butter yellow or brownish, while the lower value indicates tua.Semakin brown butter nutmeg high proportion of coconut sugar then the resulting color values lower jam. That is because the color of brown sugar coconut palm sugar caused .Warna brown coconut sugar has a reducing sugar content is high. According to Santoso (1988), a reducing sugar content high enough on the coconut sugar for the formation of brown palm sugar.

Besides the higher the proportion of the pineapple jam causes the color values began to decline. That is because pineapples are rich in carbohydrates, made up of several simple sugars for example sucrose, fructose and glucose (Rismunandar, 1989). Fructose and glucose is a reducing sugar which cause Maillard reactions run faster.

4. The aroma of nutmeg

Aroma is an important factor for consumers in choosing the food products disukai.Menurut Winano (1991) that in

in many respects, the delicacy of the food is determined by the smell of food.

Friedman test results showed that the combination treatment between the proportion of sugar with palm sugar (G) and the proportion of meat nutmeg with pineapple (N) a very significant effect on the aroma of nutmeg on nutmeg jam. Nutmeg aroma of nutmeg butter ranges from somewhat stronger (1.83) to strong (2.53). The influence of the proportion of sugar with palm sugar (G) and the proportion of meat nutmeg with pineapple (N) on the aroma of nutmeg butter is presented in Figure 5.

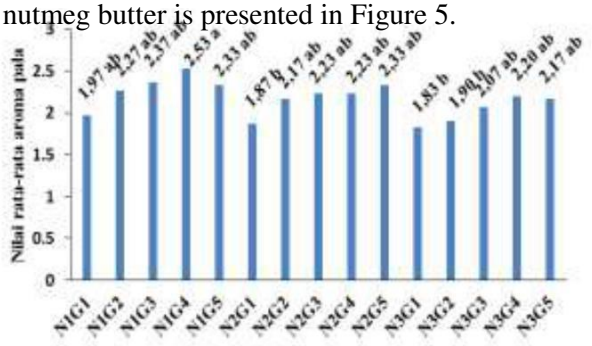


Figure 5. Value aroma of nutmeg on nutmeg jam on a variety of combined treatment

N1 = proportion of meat nutmeg with pineapple (9: 1); N2 = the proportion of meat nutmeg with pineapple (8: 2); N3 = proportion of meat nutmeg with pineapple (7: 3); G1 = the proportion of sugar with palm sugar (100: 0); G2 = the proportion of sugar with palm sugar (75:25); G3 = proportion of sugar with palm sugar (50:50); G4 = proportion of sugar with palm sugar (25:75); G5 = proportion of sugar with palm sugar (0: 100)

N1G4 treatment combination has the highest value of 2.53 nutmeg aroma is strong while the lowest value in the combination of nutmeg aroma N3G1 treatment was 1.83 which is a bit strong. Based on the results showed that there was an increase in the value of the aroma of nutmeg when increasing the proportion of sugar coconut. That is because the scent of coconut sugar is not too strong. Besides the ever-increasing proportion of pineapple, the aroma of nutmeg decreases. This is due to the pineapple has a volatile component that will cover the scent of nutmeg in nutmeg butter produced.

6. Power oles

Friedman test results showed that the combination treatment between the proportion of sugar with palm sugar (G) and the proportion of meat nutmeg with pineapple (N) very significant effect on the power topical nutmeg jam. Nutmeg jam topical power ranges of 2.63 to 3.33 (is applied). The influence of the proportion of sugar with palm sugar (G) and the proportion of meat nutmeg with pineapple (N) to power topical nutmeg jam is presented in Figure 6.

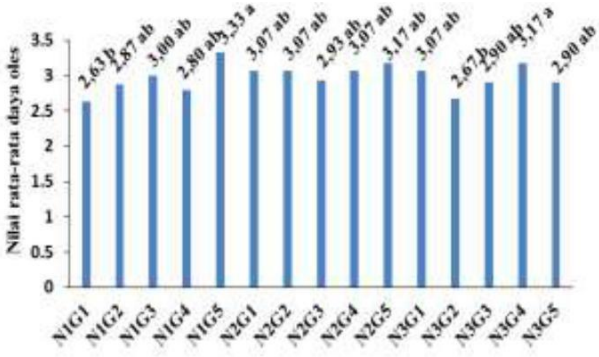


Figure 6. Rated power nutmeg butter rubbed on the various treatment combinations

N1 = proportion of meat nutmeg with pineapple (9: 1); N2 = the proportion of meat nutmeg with pineapple (8: 2); N3 = proportion of meat nutmeg with pineapple (7: 3); G1 = the proportion of sugar with palm sugar (100: 0); G2 = the proportion of sugar with palm sugar (75:25); G3 = proportion of sugar with palm sugar (50:50); G4 = proportion of sugar with palm sugar (25:75); G5 = proportion of sugar with palm sugar (0: 100)

The combination of the carrying out of proportion N1G5 have the highest power value oles 3.33 (easily applied) and the lowest rate in the combination treatment N1G1 ie 2,63 (is applied). The results showed that the higher the proportion of coconut sugar then rub butter nutmeg power value higher. The use of coconut sugar in jam making jam nutmeg improving topical generated where coconut sugar has a soft tekstrur to improving topical. Instead use the proportion of sugar in the manufacture of butter nutmeg cause topical generated power was uneven and difficult to smeared. This caused a convenient form sugar crystals.

3.4. favorite

Friedman test results showed that the combination treatment between the proportion of sugar with palm sugar (G) and the proportion of meat nutmeg with pineapple (N) A very significant effect on the jam nutmeg. A nutmeg jam value ranges like (3,80) to neutral (2.87). The influence of the proportion of sugar with palm sugar (G) and the proportion of meat nutmeg with pineapple (N) to A nutmeg jam is presented in Figure 7.

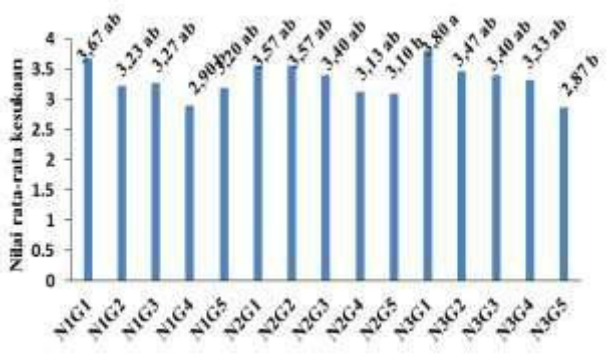


Figure 7. The value fondness nutmeg jam on a variety of combined treatment

N1 = proportion of meat nutmeg with pineapple (9: 1); N2 = the proportion of meat nutmeg with pineapple (8: 2); N3 = proportion of meat nutmeg with pineapple (7: 3); G1 = the proportion of sugar with palm sugar (100: 0); G2 = the proportion of sugar with palm sugar (75:25); G3 = proportion of sugar with palm sugar (50:50); G4 = proportion of sugar with palm sugar (25:75); G5 = proportion of sugar with palm sugar (0: 100)

N3G1 treatment combination has the highest A value of 3.80 is really like, while the lowest value in the combined treatment by 2.87 N3G5 is like. The results showed that the higher the use of coconut sugar is getting menurun.Hal A value meal is because not accustomed to using coconut sugar in

manufacture selai.Pada general in making jams using sugar as a source of sugar so that the panelists preferred the use of nutmeg jam sugar 100% as panelists familiar with the jam that use sugar.

CONCLUSION

The proportion of sugar with the right palm sugar to produce nutmeg butter with a soft texture, taste a little bitter tasted, delicious flavor and is lubricated ie the proportion of sugar with palm sugar 25:75. The use of these proportions produce nutmeg butter with jam easily applied (3,17) and tinggkat A love (3.33). The proportion of meat with pineapple nutmeg right to produce nutmeg butter with a delicious flavor and bitterness

who does not feel that the proportion of meat nutmeg

with pineapple 7: 3. The proportion of Use

produce a dark brown color (1.1) and the level

A love (3.33). The proportion of sugar to

gulakelapa25: 75danproporsidaging nutmeg

with nenas7: 3merupakan best combination

with dark brown color (1,1), a little nutmeg aroma

strong (2.20), is lubricated (3.17) and the level

A love (3.33).

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