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EMPING FROM CASSAVA WITH TAPIOCA ADDITION

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Abstract: *Cassava is one of the carbohydrate-producing plants that has the potential in nutritional value and productivity in almost every region of Indonesia. Processing cassava into Emping is the efforts to diversify cassava product and also produces healthy snacks. Emping made from cassava through the processing process include steaming, forming, and drying. Tapioca flour is added to increase crispness. The purpose of this study was to determine the effect of addition of tapioca flour on physical, chemical and organoleptic properties. This study was arranged in a Randomized Block Design (RBD) using 1 treatment factor, addition of tapioca flour with 3 levels, 2,5%; 5%; and 7,5%. The results showed the addition of tapioca flour gave a significant effect on the water content and starch content, but did not have significant effect on the brittleness and organoleptic (taste, aroma, color, and texture) of emping cassava. Water content ranged from 11,405% -14,295%, starch content ranged from 52,483%-54,63%, Brittleness ranged from 7,167 N - 8,967 N. The T3 treatment (7.5% tapioca flour) received the highest favorite value for taste, while T2 (5% tapioca flour) obtained the highest favorite value for aroma, color, and texture.*

Keywords: *Emping, Cassava, Tapioca.*

1. Introduction

Cassava is one of the carbohydrate-producing plants that has the potential in nutritional value and productivity in almost every region of Indonesia. During this time, cassava has been processed into various kinds of food products. Various kinds of processed cassava, for example fried/boiled, chips, tape, gethuk, etc.

Emping is a side dish or can be eaten as a snack. Generally, Emping is made from melinjo and everyone likes it because its typically taste. Emping is a food made from melinjo seeds,crushed, dried, and fried like crackers. However, melinjo contains high purine so it is not recommended to be consumed by gout sufferers. Emping from cassava is expected to be an alternative to healthy snacks.

Tapioca flour is a starch granule found in tree cassava. In the food industry, tapioca flour is used as thickener and binder, such as in making pudding, soup, baby

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food, ice cream, meat sausages, pharmaceutical industry, and so on. Tapioka serves as an ingredient in making meatballs, and raw materials for making crackers to produce crispy crackers.

2. Theoretical Framework

Making emping from cassava is start with steaming cassava and then mashing it. Before emping is formed, Tapioca flour is added to bonding the mixture. Beside that, the levels of amylopectin in tapioca flour are expected to increase puffiness and crispness of emping cassava. According to Haryadi (1993), generally the more amylopectin content is the more crackers will rise. This is because the amylopectin structure is less compact and not strongh enough to hold the rapid rise of mass during frying. According to SNI 01-3712-1995, good quality of emping are thin and look rather clear and have similiarity diameter, so they can be fried immediately. The hypothesis of this research is the addition of tapioca flour will affect the physical, chemical, and chemical properties of emping cassava.

3. Research Method

This research was arranged in a Randomized Block Design (RCBD) using 1 treatment factor, that is the addition of tapioca flour with 3 levels, T1 = 2.5% Tapioca, T2 = 5% Tapioca, and T3 = 7.5% Tapioca. Each treatment was repeated 3 times.

The process of making emping cassava includes sorting, cutting, peeling and washing cassava, and then steaming cassava for 30 minutes. Mashing cooked cassava, add tapica flour, salt, and garlic powder. After that forming into thin round shape. Drying in the oven to reduce water content and then frying emping cassava.

Analysis emping cassava includes physical, including fractureability in emping cassava, analysis using tensile strength. Chemistry, including water content and starch content in emping cassava. Determination of starch content using the Luff Schoorl method. while the determination of water content is carried out by oven drying method (AOAC, 1970). Organoleptics, analysis of preferences for emping cassava includes taste, color, aroma and texture (crispness). In this method the panelists were asked to assess their level of interest in the taste, color, aroma and

crispness of emping cassava by giving values or scores (5 = really like, 4 = likes, 3 = neutral, 2 = rather like, 1 = dislike).

4. Results and Discussion

Water content

Water content in emping cassava ranged from 11.405% -14.295%. It can be seen that the lowest average water content of emping cassava is T1 (2.5% tapioca flour) which is equal to 11.405%. While the highest average water content is T3 treatment (7 % tapioca flour) of 14.295%.

The more the percentage of tapioca flour is added, the water content of the chips will increase. Winarno (1992), reporting this condition can occur because the number of hydroxyl groups in the starch molecule is very large so that the ability to absorb water becomes large as well. The more percentage of tapioca flour added, the starch bound to the water content will increase so that the water content of the chips increases.

With the speed of movement of material water to the surface which causes hardening on the surface of the material (case hardening), (Taib, G., Said, E.G., and Wiraatmadja, S., 1988). Even though the outside looks dry but there is still a lot of water in the material. From the results of the analysis of the various water content of emping cassava, the treatment showed significantly different. This can be seen from the ratio of Fhit (19.62) > Ftab (2.4). The addition of tapioca flour has a significant effect on the water content of emping cassava. The results of the duncan test can be seen in Table 1

Table 1 Duncan test results for the water content of emping cassava

Tapioca	Water content
T1 (2,5%)	11,405a
T2 (5 %)	12.795b
T3 (7,5 %)	14.295c

different notations in the same column indicate a significant difference at α = 5%

Amylose has the ability to absorb water easily and release it again, so that during the drying process, materials that have low amylose content will find it difficult to release the water content in the material causing the water content contained in emping cassava to remain high.

Starch content

Determination of starch content in this study using the method of Luff Schoorl. The starch content of emping cassava ranged from 52.483% to 54.52%. From the results it can be seen that the lowest average starch content of emping cassava is the treatment of T2 (2.5% tapioca flour) that is equal to 52.483%. While the highest average starch content was T3 treatment (7.5% tapioca flour) of 54.52%.

From the results of the analysis of the variety of emping cassava starch content, the treatment showed significantly different. This can be seen from the ratio of Fhit (2.612) <Ftab (2.4). The addition of tapioca flour gave a significant effect on the levels of emping cassava. Tapioca flour is starch flour extracted from cassava tubers, so the addition of tapioca flour will tend to increase the levels of emping cassava. According to Makhfoeld (1982), the starch content in tapioca flour is in large numbers (88.2%). The results of the test for starch content can be seen in Table 2

Table 2 Duncan Test Results for starch content of Emping cassava

Tapioca	Strach content
T1 (2,5%)	53,3900 b
T2 (5 %)	52,4833 ab
T3 (7,5 %)	54,5200 a

different notations in the same column indicate a significant difference at α = 5%

From Table 2 it can be seen that the treatment of T1 does not show a significant difference with the treatment of T2 but is significantly different from the treatment of T3, the treatment of T2 is not significantly different from the treatment of T3. The addition of tapioca flour in the treatment of T1 and T3 showed a significant difference in effect, it can be seen that the addition of more tapioca flour

concentrations caused more starch levels. Tapioca flour is starch extracted from cassava tubers, so the addition of tapioca flour will increase starch content.

Fractureability

Determination of fracture in this study using tensile strengh. texture strengh can affect consumer acceptance of the product. fractureability of emping cassava ranged from 7.167 N - 8.967 N. From the results of laboratory tests it can be seen that the average content of the lowest fractureability of emping cassava is T1 (2.5% tapioca flour) which is 7.167 N. While the highest fracture is is the treatment of T3 (7.5% tapioca flour) of 8,967 N. The histogram of the average fractureability of emping cassava can be seen in Figure 1. From the analysis of the variability of cracked chips of cassava, the treatment showed no significant difference. This can be seen from the comparison of Fhit (2.162) <Ftab (2.4). The addition of tapioca flour gave no significant effect on the fractureability of emping cassava. however, it can be seen that the more addition of tapioca flour will increase the fracture. Starch has an important role for making chips because it can affect its texture. Amylopectin is known to stimulate the development process, so the chips with amylopectin which are high enough will be porous, crisp and crispy (Muchtadi, et al. 1988)

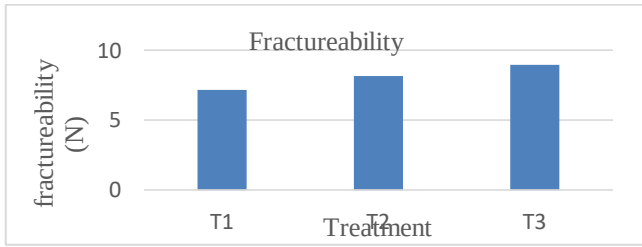

Figure 1 Histogram for average fractureability of emping cassava

Organoleptic Test Results

Taste

The organoleptic test result for the taste parameter obtained the highest score on T3 with a percentage of 60% at score 3 or neutral. From the total value of neutral, like and really like shows that the more tapioca flour, the higher the value panelists' preference for emping cassava.

The results of statistical analysis showed that the percentage of tapioca flour addition to the taste of emping cassava was not significantly different from $\chi 2$hit (2.26) $<\chi 2$ tab (5.99) or no significant effect (P = 0,000 $<\alpha$ = 0.05). The histogram for taste parameter score of emping cassava is shown in Figure 2

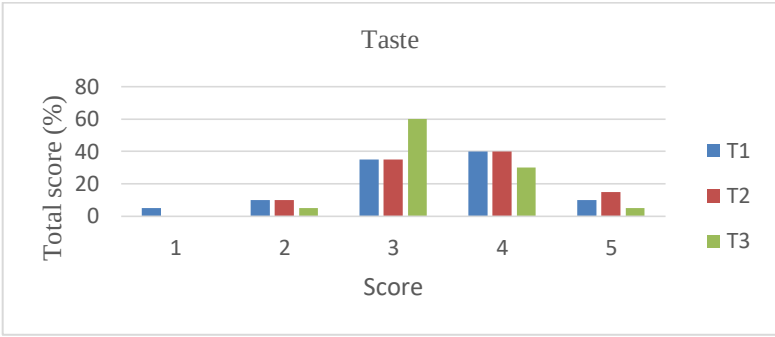

Figure 2 Histogram for taste parameters score of emping cassava

Aroma

Data on the results of organoleptic scent parameters the highest score obtained was obtained at score 3 or neutral with a percentage of 50%. From the acquisition of scores it can be seen that T2 and T3 treatments have a higher neutral value than T1. With the addition of tapioca flour, the peculiar aroma of cassava in the chips will decrease, causing the preference of panelists to decline. However, most panelists consider neutral because the aroma of emping cassava is almost similar between treatments.

The results of statistical analysis showed that the percentage of addition of tapioca flour to the aroma of emping cassava was not significantly different from $\chi 2$hit (0.02) $<\chi 2$ tab (5.99) or no significant effect (P = 0,000 $<\alpha$ = 0.05). The histogram for aroma score of emping cassava is shown in Figure 3

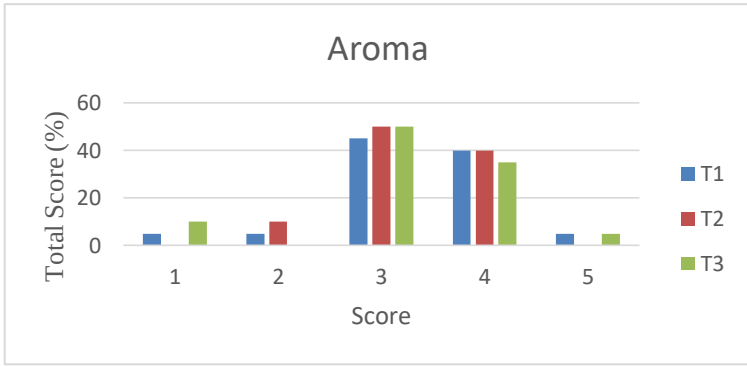

Figure 3 Histogram for aroma score of Emping cassava

Data on organoleptic results of color parameters, the highest score was obtained by T2 treatment with a percentage of 60%. From the acquisition of scores it appears that T2 treatment has a higher preference value than the other treatments. With the addition of tapioca flour, the brighter color of emping cassava causes the preference of panelists to increase. However, some panelists don't like colors that are too white as in T3.

The results of statistical analysis showed that the percentage of addition of tapioca flour to emping cassava was not significantly different from T2 hit (1.50) $<\chi 2$ tab (5.99) or no significant effect (P = 0,000 $<\alpha$ = 0.05). Tapioca flour has a white color which causes the emping cassava to be produced to give a bright color. The histogram for color parameter score of the emping cassava is shown in Figure 4

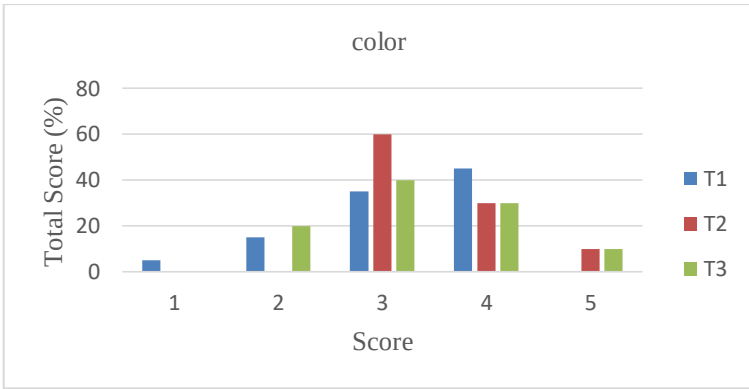

Figure 4 Histogram for color score of Emping cassava

Texture

The results of the organoleptic test data for the highest color score parameters obtained T2 treatment with a percentage of 55%. From the acquisition of scores it can be seen that treatment T2 has a favorite value (score 4) which is higher than the other treatments. The addition of tapioca flour can increase the crispness of emping cassava, but too much tapioca flour will increase the hardness of emping cassava so the panelists don't like it.

The results of statistical analysis showed that the percentage of addition of tapioca flour to empirical chips was not significantly different from $\chi 2$hit (0.28) $<\chi 2$ tab (5.99) or no significant effect (P = 0,000 $<\alpha$ = 0.05). The histogram for texture score of emping cassava is shown in Figure 5

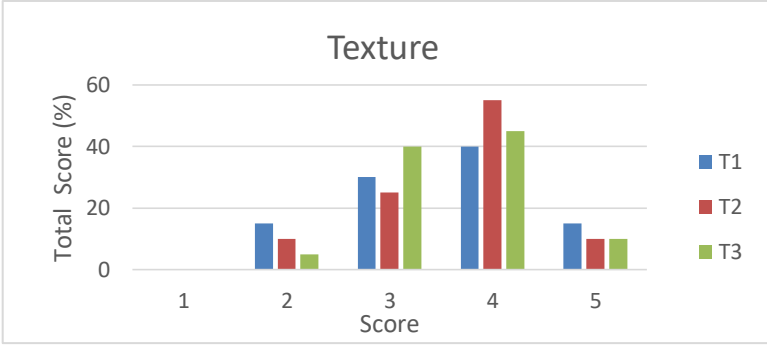

Figure 5 Histogram for texture score of emping cassava

5. Conclusion, Implication and Limitation

5.1. Conclusion

The treatment of addition of tapioca flour has a significant effect on the water content of emping cassava, the more the proportion of tapioca flour, the water content will increase. Water content of emping cassava ranged from 11.405% -14.295%.

The treatment of addition of tapioca flour has a significant effect on the starch content of cassava, the more the proportion of tapioca flour, the starch content tends to increase. Emping cassava starch content ranged from 52.483% to 54.63%.

The treatment of addition of tapioca flour does not have a significant effect on the fractureability of emping cassava, but the more the proportion of tapioca flour causes the fractureability to increase. fractureability ranged from 7,167 N - 8,967 N.

The treatment of addition of tapioca flour does not have a significant effect on organoleptic taste, aroma, color, and texture of emping cassava. The T3 treatment (7.5% tapioca flour) received the highest favorite value for taste, while T2 (5% tapioca flour) obtained the highest favorite value for aroma, color, and texture.

5.2. Implication and Limitation

The limitation of this research is the best treatment has not been determined, however it can be seen from the results of the organoleptic test that T2 treatment (tapioca 5%) obtained the highest score for the aroma, color and texture of emping cassava. It is recommended for large-scale manufacturing to use a forming tool, in order to improve the efficiency of manufacturing time also for uniform size so it can improve the quality of emping cassava.

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