Characterization of fruit leather with carrageenan addition with various bananas

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Abstract. Fruit leather is a dried fruit treat, chewy and flavorful. It is used for the product prepared by dehydration of fruit puree with or without sugar and acid. While bananas is perishable fruit that has various types so that fruit leather is one of food processes to preservation and to increase value. Fruit leather have to plastic texture. Carrageenan is polysaccaride that has function as gel formation. The objectives of this study were 1) to study the effect of fruit leather of various bananas and 2) to study the effect of adding carrageenan for bananas fruit leather.

The methode was using three types of ripe banana that were raja sereh (A); muli (B) and white kepok (C). The bananas were steamed at 8 minutes after that removed peel and sized using blender for 3 minutes as fruit purees. The fruit purees were added 0,6% carrageenan and without added carrageenan then was dried at 60°C for 12 hours. The fruit leather were analyzed by physico chemical.

The fruit leathers had plastic form. Various bananas affected water content; ash content; Aw content, texture and color. The water content of fruit leather raja sereh was highest (15,08% (0% carrgenan) and 16,05% (0,6% carrgenan)) so that the aw value of sereh banana (0,68 and 0,7%) was higher than muli banana (0,61 and 0,59%) and white kepok (0,64 and 0,6%). Additional of carragenan affected to texture of fruit leathers, F value of adding carrageenan 0,6% was higher than adding carrageenan 0%.

1 Introduction

Banana is a tropical fruit that is great acceptance and it has high calories and nutritive value. There are many various of bananas that has different of colors, tastes and textures. Moreover, Banana is perishable fruit that cannot be preserved for longer time after harvesting. According to Marzelly et. al. (2017) [1], Indonesia produced bananas from 6.862.559 ton until 7.299.266 ton in 2014 but consumption of bananas is only 1.537.665 ton. Therefore, price of banana is lower than another. Another ways to increase price of banana is modified into various product likes banana chips, figs, flour, powder, jam etc.

Processing is required for preserving product for longer periods and drying is one of the most widley used techique for preserving foods. Fruit leathers are dehydrated fruit preparted by producing fruit puree, pouring at certain sample and drying. Fruit pulp based of fruit leater are nutrious and acceptable to consumer, moreover they contain dietary fiber, carbohydrate, minerals, vitamins and antioxidants [2]. Adding of sugar, acid, carrageenan or pectine are usually used to prepared fruit leathers. The drying process and thickness of furt leathers are the main factors influencing final
product. Moreover, the drying process entails eliminating as much water as possible from fruits in order to inhibit enzyme and bacteria activity [3]. Carrageenan is polysaccharides that could make gel formation that effects to plastis texture. According to Fauziah et. al. [4], the best condition of adding carrageenan was 0,6%. Fruit leather of tanduk banana (*Musa corniculata*) had the best result of organoleptic and chemicalphysical analysis.

Indonesia has many cultivars of bananas. White kepok(*Musa paradisiaca* L.), sereh (*Musa sapientum*) and Uli (*Musa paradisiaca sapientum*) bananas all of them are not popular to consumption due to astringent taste. Fruit leather is one of ways to increasing of bananas value. Fruit leather are not available on market in Indonesia so that they are potential as modify derivative of bananas. The objectives of this study were to study the effect of fruit leather of various bananas and to study the effect of adding carrageenan for bananas fruit leather.

2 Materials and Methods

2.1 Materials

The riped bananas were obtained from local market of Way Kadadi, Bandar Lampung. Carrageenan was obtained from local market of Yogyakarta. The equipments were blender, analtical weight, oven, minolta colorimeter (chromameter CR-400/410), Unit Texture Machine, propipet, spatula, and glass wares.

2.2 Preparation of fruit leather

The banana puree was prepared from formulation and procedure developed by Febriyono [5]. The banana were termally treated for 8 min after that removed peel and sized using blender for 3 min as puree. The puree was added 0,6% carrageenan at 95-100 °C for 2 min therefore it was dried at 60 °C for 12 hours.

2.3 Assays

The water content and ash content were determined by method AOAC [6]. Aw value was determined by method AOAC 978.18 hygrometric method AOAC[7]. Lightness was determined by method of Rosel et. al. [8] using Chromameter (Konica Minolta). Tensile streght was determined by Tensile Stenght Machine.

2.4 Experimental Design

All experiments and analytical procedure were carried out at least in double analysis and the results were expressed as means. Two way ANOVA analysis was done using microsoft excel and statistical significance was acceptable at p<0,05.

3 Results and discussion

3.1 Water contents

The obtained water content of various fruit leather was in range 12,67-16,49%, while according to Karyananti et. al. [9], water content owned of fruit leather was below 19 g/ 100g. When the water content is below of 19g/100g has longer of shelflife. According to Tabel 1, Fruit leather of various of cultivar bananas had significanct different from water content. Sereh banana had the higher water content than others, moreover it has soft texture. According to Karyantina et. al. [9], the softer texture of banana, the higher of water content. Various of banana had effected to water content of fruit leather because it has different texture. Adding carrageenan had effected of water content, as carrageenan could bind of water. In addition, sulphite has negative change on polymers forming ester sulphite which hydofilic form [4].
### Table 1 Effect fruit leather of various bananas and adding carrageenan on water content

| Cultivars               | Water content (%) | Adding carrageenan |
|------------------------|-------------------|--------------------|
|                        |                   | 0%                 | 0,6%               |
| Sereh banana (A)       | 16,49<sup>a</sup> | 16,05<sup>ab</sup> |
| Muli banana (B)        | 12,93<sup>b/a</sup>| 12,67<sup>b</sup>  |
| White Kepok (C)        | 13,46<sup>c/a</sup>| 13,60<sup>c/b</sup>|

#### 3.2 Ash content

Ash content of fruit leather was different of various banana. From Table 2, ash content was in range 3,03-4,62%. According to Marzelly et. al. [1], caragenat have 5,3 g caesium; 1,14 g iron; 20,2 mg sulfat; 160 mg magnesium; 22,4 g sodium and 13,4 mg/100 g potasium that indicated adding carrageenan increasing ash content.

### Table 2 Effect fruit leather of various bananas and adding carrageenan on ash content.

| Cultivars               | Ash content (%) | Adding carrageenan |
|------------------------|-----------------|--------------------|
|                        |                 | 0%                 | 0,6%               |
| Sereh banana (A)       | 3,07<sup>a/a</sup> | 3,03<sup>a/a</sup> |
| Muli banana (B)        | 3,82<sup>b/a</sup> | 4,03<sup>b/b</sup> |
| White Kepok (C)        | 4,66<sup>c/a</sup> | 4,62<sup>c/a</sup> |

#### 3.3 Water activity

From Table 3, It could be seen that various bananas had different Aw value. Aw value of sereh banana (0,68 and 0,7%) was higher than muli banana (0,61 and 0,59%) and white kepok (0,64 and 0,6%). Aw value is affected on pectine concentration [2]. The relationship between Aw value and water content (Table 1) showed the effect of increase of water content to higher Aw value of fruit leather. Therefore, The Aw value had been effected by various of bananas. The carrageenan can be binding water and forming gel formation as sulphite form crossing linking [4]. The Aw value affect on shelflife of product. The lower Aw value, the longer shelflife. The Aw value of fruit leather (0,59-0,68%) were lower than Aw value of life micoorganism.

### Table 3. Effect fruit leather of various bananas and adding carrageenan on water activity.

| Cultivars               | Aw(%)             | Adding carrageenan |
|------------------------|-------------------|--------------------|
|                        |                   | 0%                 | 0,6%               |
| Sereh banana (A)       | 0,68<sup>a/a</sup>| 0,7<sup>b/a</sup>  |
| Muli banana (B)        | 0,61<sup>b/a</sup>| 0,59<sup>b/b</sup> |
| White Kepok (C)        | 0,64<sup>c/a</sup>| 0,6<sup>c/b</sup>  |
3.4 Texture of various fruit leathers

The obtain of $F$ value had range texture 2.74-6.78 N (Table 4). Adding of 0.6% carragenat was increasing texture of fruit leather. $F$ value indicated force that must come out to tear fruit leather. The higher $F$ value, the harder texture of fruit leather. Carrageenan is polysaccharide that make gel formation. Gel formation will trap water and form three dimensions network [4]. Thereover, various of banana effected of $F$ value, pectine of banana content of that has function as like as carrageenan. The content of pectine on bananas was 52.4%, therefore the carbohydrate content of sereh and muli bananas both of them were higher (62.19%) than white kepok (45.73%) Kertesz (1951)[10]; Florent et. al.[11]. Moreover, it indicated that the higher content of carbohydrate, the higher content of pectin.

| Cultivars              | F value (N) | Adding Carrageenan |
|------------------------|-------------|-------------------|
|                        | 0%          | 0.6%              |
| Sereh banana (A)       | 6.12a       | 6.72ab            |
| Muli banana (B)        | 6.63a       | 7.38ab            |
| White Kepok (C)        | 2.74b       | 4.01b             |

3.5 Color measurements

$L$ value is indicated lighter in color. Muli banana had lighter than sereh banana. Adding carragent was not affected of brithness of fruit leather. According Marzelly et. al. [1], brightness of fruit leather was caused of caramolization process sugar and heat. Various of bananas has different sugar contents so that $L$ value was effected by various of bananas.

| Cultivars              | Adding carrageenan |
|------------------------|--------------------|
|                        | 0%  | 0.6% | 0%  | 0.6% | 0%  | 0.6% |
|                        | L Value | a Value | b Value | L Value | a Value | b Value | L Value | a Value | b Value |
| Sereh banana (A)       | 41.42a | 41.75a | 2.27a  | 2.54a  | 14.11a | 14.47a  |
| Muli banana (B)        | 43.33b | 43.54b | 3.65b  | 3.66b  | 23.53b | 24.08b  |
| White Kepok (C)        | 46.75c | 46.57c | 9.34c  | 9.7c   | 25.51c | 25.75c  |

4 Conclusion

Fruit leather could be made from various bananas. Various cultivars have various characterization of fruit leather. Carrageenan has effected gel formation in fruit leather beside pectin was contented in the bananas. According of Aw value, fruit leather could be alternative to increase of bananas value. The texture and color of white kepok bananas of both were better than others.

5 References

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