CHARACTERISTICS OF *IPOMEA AQUATICA*-SULFUR CHIPS QUALITY FROM KARO LAND, NORTH SUMATERA

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Abstract. The research about Characteristics of *Ipomea Aquatica* - Sulfur Chips Quality From Karo Land, North Sumatera was conducted at April until August. This study aims to determine carbohydrate content, protein content, total fat content, sulfur content, water content, ash content, peroxide value, shelf life and organoleptic value of *Ipomea aquatica* - Sulfur chips from Karo Land, North Sumatera. Protein content was about 9,58%; carbohydrate content was about 5,73%; total fat content was about 11,04%; ash content was about 82,21%; sulfur content was about 54,25%; water content was about 0,15%, peroxide value was about 7,14 meqO_2/kg. Shelf life was observed by water content at 27 ^{0}C until 90 days without preservatives. Water content increased continuously at 27 ^{0}C ie 0,15% at the first day and 7,3% at 90 days. Organoleptic value of chips based on colour, texture, aroma and flavor. The colour of chips ie 15% was really like, 80% was like and 5% was dislike. The texture of chips ie 5% was very crunchy, 85% was crunchy, 10% was not crunchy. The aroma showed that 5% was really like, 75% was like, 10% was less like and 10% was dislike. The flavor of chips ie 20% was really like,75% was like and 5% was less like.
Key words: **characteristics**, **chips,karo land, *Ipomea Aquatica*-sulfur, north sumatera.**

A. INTRODUCTION

Karo Regency is one of the Regencies in North Sumatra Province whose territory is in the mountains of North Sumatra. It lies between two active volcanoes, Sibayak and Sinabung. Geographically, Karo Regency is between 2º50'-3º19' North Latitude and 97º55'- 98º38' East Longitude with an area of 2127.25 Km^2 or 2.97% of the area of North Sumatra Province. (www.karokab.go.id).

The most famous agricultural product from Semangat Gunung village is *Ipomea aquatica*-sulfur that can growth in sulfur and fresh water. *Ipomea aquatica* is very commonly vegetable that is consumed by the people of Indonesia. In 100 grams of *Ipomea aquatica* contains 29 kilocalories of energy, 3 grams of protein, 5.4 grams of carbohydrates, 0.3 grams of fat, 73 milligrams of calcium, 50 milligrams of phosphorus, and 3 milligrams of iron. In addition, *Ipomea aquatica* is also contains 6300 IU of vitamin A, 0.07 milligrams of vitamin B1 and 32 milligrams of vitamin C. So it is very good for the digestive process, maintain visual stability, prevent diabetes mellitus, prevent thrush and bleeding gums. (http://balitsa.litbang.pertanian.go.id). *Ipomea aquatica* also has fiber content and high protein which can be used as animal feed (Agustono, 2010). *Ipomea aquatica* is thought to have bioactive components that has been used as traditional medicine (Choudhury et al. 2010).

One of the processed products in Semangat Gunung village is *Ipomea aquacultur*-sulfur chips. The women have produced it but they dont know the chemistry content that contained in *Ipomea aqucultur*-sulfur chips. Important sensory properties that determine a person's assessment of fried products such as chips are appearance, flavor, aroma, colour and
texture. Shelf life of product is important to know the time needed for safety consumed. So, we conducted a study about "Characteristics of *Ipomea aquacultur*-sulfur Chips Quality in Karo Land, North Sumatra"

B. MATERIALS AND METHODS

Time and Location

The research was about Characteristics of Ipomea aquatica-sulfur Chips Quality From Karo Land, North Sumatera was conducted at April until August in Biochemistry Laboratory, Mathematic and Natural Science Faculty, University of Sumatera Utara.

Procedures

Preparation Ipomea aquatica-Sulfur ChipsIpomea aquatica – sulfur chips was made from Ipomea aquatica – sulfur and some ingredients such as flour, coriander, salt, pepper and candle nut then fried with hot branded fried oiluntil golden brown.

Ash Content

Measurement of total ash content was carried out by drying ash method. Samples as much as 3g are weighed on the cup that has known weight. Then it is fabricated above the flame and ignored in the furnace at a temperature of 550ºC until perfect ignition. After that it is cooled in an exchanger and weighed to obtain a fixed weight.

Calculation of ash content is done by comparing the weight of ash and the weight of the sample multiplied by 100%.

Total Water Content

Total water content measurement was carried out by thermogravimetric method (oven method). Samples as much as 2 g were weighed on a plate that was known for its weight and then dried in an oven at 105º C for 3 hours. After that it is cooled in an exchanger and weighed to obtain a fixed weight. Measurement of water content was obtained by comparing the weight of the sample before drying and the weight lost after drying multiplied by 100%.

Total Protein Content

Total protein content measurements were carried out using the Kjehdahl method. The mashed sample was weighed 200-500 mg and then put into the Kjeldahl flask. 10 mL of solid concentrated sulfuric acid and 5 g of catalyst (mixture of K2SO4 and CuSO4.5H2O 8: 1) were added and destruction was carried out until the liquid was clear green. After cooling the solution is diluted with distilled water to 100 mL in a measuring flask. The solution was pipette 10 mL and put into a Kjeldahl distillation then added 10 mL 30% NaOH which was standardized by a solution of oxalic acid. Distillation is run for about 20 minutes and the distillate is stored in an erlenmeyer containing 25 mL of 0.1N HCl solution which has been standardized by borax (the tip of the condenser must be immersed in HCl solution). Then excess HCl is titrated with 0.1 N NaOH solution with a mixture indicatorbromcresol green and methyl red.

Total Carbohydrate Content

Measurement of total carbohydrate levels in the sample by formula:

% Carbohydrate = 100% -% (protein + fat + ash + water)

Sulfur Content

Weigh carefully 0.5 g of sample enter in 250 mL erlenmeyer, add 10 mL of 4 N HCL solution while stirring then add 100 mL of water and heat until boiling.Quickly add the boiling BaCl2 (10 mL BaCl2 0.5 N in 50 mL water) while stirring. Leave the precipitate to settle and add 1 drop of BaCl2, if it is not exposed to the white precipitate the addition of the solution is stopped.Leave the sediment in the waterbath for 1 hour then settle pour with hot water up to 4 times.Filter with ash-free filter paper.Wash then remove it in a poselin crust and dry it in an oven.Remove the deposits obtained at a temperature of 700-1100^{0}C for about 3 hours.Cooled in the desiccator to room temperature.Weigh and determine the sulfur content in sample.

Gravimetri Factor (GF) = Ar S : Mr sediment

% S = {(sediment mass x Gravimetri Factor) : Mr sample} x 100%

Peroxide Number

Peroxide numbers are determined byprocedure as follows, 10 gram product was inserted into a closed Erlenmeyer and30 ml of a mixture of acetic acid mixture was addedglacial: chloroform (3: 2 v / v). After the oil dissolvesperfectly added 0.5 ml of saturated KI solutionand left for 1 minute while being shaken, then30 ml of distilled water was added. Iodine released by peroxide titrated with solutionstandard sodium thiosulfate ($Na_2S_2O_3$) 0.1015 Nwith the starch indicator until blue is lost. Peroxide numbers are stated with formula.

$$\text{Peroxide number} = \frac{(S-B) \times N \times 1000}{\text{(meq peroksid/kg fat) sample mass (g)}}$$

S = sample titration

B = blanko titration

N = Normality of $Na_2S_2O_3$

Shelf Life

Shelf life measurement based on water content and organoleptic assesment during storage at 27 ^{0}C without preservatives until 90 days.

Organoleptic Assesment

Organoleptic assesment based on flavor, aroma, colour and texture of Ipomea aquatica-sulfur chips. The test was carried out by testing the preference level on 20 untrained panelists The level of flavor, aroma and colour with 5 parameters were really like, like, less like, dislike and really dislike. The level of texture with 5 parameters were very crunchy, crunchy, less crunchy, not crunchy, and not very crunchy.

C. RESULTS AND DISCUSSION

Chemistry Analysists of *Ipomea aquatica*-sulfur chips from Karo Land, North Sumatera

The result of chemistry analysists of *Ipomea aquatica*-sulfur chips from Karo land, North Sumatera was showed in Table 1.

Table 1. Chemistry Analysists of *Ipomea aquatica*-sulfur chips from Karo Land, North Sumatera

Component	Value
Protein	9,58 %
Total Fat	11,04 %
Ash	82,21%
Water	0,15%
Sulfur	54,25 %
Peroxide	7,14 meqO_2/kg
Carbohydrate	5,73 %

Shelf life

Water content increased continously during storage until 90 days at 27 ^{0}C without preservatives. The result showed that there were change of organoleptic assessment (Table 2.)

Table 2. Shelf life based on water content during storage at 27 ^{0}C without preservatives

Days	Value (%)	Organoleptic assesment
0	0,15	Crunchy
5	0,34	Crunchy
10	0,56	Crunchy
15	0,92	Crunchy
20	1,43	Crunchy
25	2,05	Crunchy
30	2,43	Crunchy
35	2,92	Crunchy
40	3,03	Crunchy
45	3,57	Crunchy
50	3,85	Crunchy
55	4,35	Crunchy
60	4,94	Crunchy
65	5,28	Less Crunchy
70	5,73	Less Crunchy
75	5,92	Less Crunchy
80	6,45	Less Crunchy
85	6,78	Not crunchy, rancid
90	7,31	Not crunchy, rancid

Organoleptic Assesment

Important sensory properties that determine a person's assessment of fried products such as chips are appearance, flavor, aroma, colour and texture (Table 3 and Tabel 4.)

Table 3. Organoleptic Assesment based on Aroma, Flavor and Colour

Assesment	Really Like	Like	Less Like	Dislike	Really dislike
Aroma	5%	75%	10%	10%	0%
Flavor	20%	75%	5%	0%	0%
Colour	15%	80%	0%	5%	0%

Table 4. Organoleptic Assesment based on Texture

Assesment	Very Crunchy	Crunchy	Less Crunchy	Not Crunchy	Not Very Crunchy
Texture	5%	85%	0%	10%	0%

Discussion

Chemistry analysists of *Ipomea aquatica*-sulfur chips from Karo Land, North Sumatera showed that ash component is the highest value ie 82,27% because sulfur component from *Ipomea aquatica*-sulfur chips from Karo Land is high ie 52,25%. As we know that Ipomea aquatica-sulfur growth in sulfur condition near Sibayak Mountain. Sulfur is one part of mineral, mineral is a part of ash component. Protein content was about 9,58%; carbohydrate content was about 5,73%; total fat content was about 11,04%; water content was about 0,15%. During frying, food ingredients lose water content which causes nutrient level increased in the lagging period. Ash level is used fordetect the mineral contentfound in food ingredients, be itwhich comes from food aloneor that comes from a process engine. The high ash contentindicates that has happenedmaterial contamination by tools because of friction during the process. Ash contentmore influenced by temperatureduring frying or with temperaturehigh (Asmawit and Hidayati, 2014).

Peroxide value of *Ipomea aquatica*-sulfur chips was 7,14 meqO_2/kg.Oxygen exposed, light, and high temperatures areseveral factors that affect oxidation.Use of high temperatures during frying trigger oil oxidation.Measurement of peroxide numbers onbasically is measuring peroxide levels andhydroperoxide formed at the initial stagefat oxidation reaction. Peroxide numberhigh indicates fat or oil alreadyexperiencing oxidation, but at lower number does not always mean showingearly oxidation conditions. Numberlow peroxide can be caused by ratethe formation of new peroxide is smallercompared to the rate of degradation beingother compounds, considering fast peroxide levelsdegraded and reacts with other substances(Raharjo, 2008).

Shelf life was observed by water content at 27 ^{0}C until 90 days without preservatives. Water content increased continuously at 27 ^{0}C ie 0,15% at the first day and 7,3% at 90 days. The chips was crunchy until 60 days. At 85 days, the chips was not crunchy and rancid. As the result, the shelf life of *Ipomea aquatica*-sulfur chips at 60 days. Storage time affects the water content. The presence of water in foodstuffsaffect foods ingredients in some ways,including appearance, acceptance(acceptability), storability and others. Chips are included in the ingredientsfoods with low water contentso the chips have a save powerwhich is quite long compared toother foodstuffs. Purposemanufacturing of chips is reduce the watercontained in ingredients so that the product have long self life. Tumbel and Manurung (2017), The low water content of these chipscause pineapple chips can be storedin a long time. If the chips have a high water content, so will be moist, and texture becomes not crunchy.Itcan reduce consumer acceptability.Food damaged caused of an increasetemperature. The water content contained infood products are an important factorin determining shelf life. Water contentcan also cause a reactionchemistry and change in food texture.

Rancidity is a damage or change in odor and flavor in the fat or fatty food. As one of the fatty food products, *Ipomea aquatica*-sulfur chips is susceptible to rancidity during storage. Darmajana (2007) showed that good packaging method by vacuum can reduce oxygen inpackaging so that the fat oxidation reaction can be blocked andincrease the shelf life.

The result of organoleptic assesment showed from 20 untrained panelists showed that 75% was like the flavor, 80% was like the colour, 85% was like the aroma and 85% was crunchy of *Ipomea aquatica*-sulfur chips. Color is a visualization of a product that is immediately seen in comparison with other variables. Color will directly affect the perception of panelists, according to Winarno (2002), visually the color factor will appear first and often determine the value of a product.Fried foodshave a more crunchy because ofoil uptake into ingredients. Quality of oil affect the taste of fried foods and oil componentswill absorp to material.Aroma is one of the key variables, because in general the taste of consumers towards food products is largely determined by the aroma. The smell of food determines the delicacy of food and the taste of food itself (Wellyalina et al. 2013). In the food industry the testing of aroma is considered very important because it can quickly produce an assessment of the product about the acceptance or rejection of the product. The aroma of lung flavored *Ipomea aquatica*chips is influenced by the spices used, namely garlic, coriander and candlenut. Taste is a very important factor in determining the acceptance or rejection of panelists on food (Kaswinarni, 2015)

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