ATLANTIS PRESS
*Advances in Social Science, Education and Humanities Research (ASSEHR), volume 112*
1st International Conference on Social, Applied Science and Technology in Home Economics (ICONHOMECS 2017)

# *Bitter Melon Culinary Product Innovation as One of Functional Food Varieties*

Ummi Rohajatien
Doctoral Program of Food Technology
Universitas Brawijaya
Department of Industrial Technology
Universitas Negeri Malang
Malang, Indonesia
ummi.rohajatien.ft@um.ac.id

Harijono, Teti Estiasih, Endang Sriwahyuni
Faculty of Food Technology
Faculty of Medicine[2]
Universitas Brawijaya
Malang, Indonesia.

***Abstract*— Full nutritious bitter melon consists of bioactive component used as one important component for functional food. The food processing often causes the changes of nutritious component. The aim of the research is to know the nutrition component of bitter melon culinary innovation and the nutritious component of bitter melon fruit before processed. The analysis is done towards the change of nutritious component due to the processing activity. This research revealed that innovation processing of bitter melon culinary follows the method: crushing of bitter melon material, mixing bitter melon juice with the other component material, forming the shape, steaming, cooling, cutting, and drying. The analysis of nutritious component measurement revealed that it happened the change of nutritious component because of the processing activity, however, it still contained ash, protein, carbohydrate in high enough quantity and total carotene as one of the source components for the functional foods. The implication of the research was to introduce bitter melon culinary product innovation to enrich kind of bitter melon culinary and its potential as one of functional foods.**

***Keywords*— bitter melon; culinary product innovation; nutritious component**

## I. INTRODUCTION

The plant of bitter melon (*Momordica charantia*, Linn) is a family –*Cucurbitaceae*, also known as bitter gourds, karela, bitter melon and balsam pear. The species includes *Momordica angustisepala*, *M. balsamina* (Linn), *M. cochinchinensis* (Spreng), *M cabrei*, *M. dioica* (Roxb), M. *tuberose* or *cymbalaria* are tropical vegetables often consumed in India [1]. Bitter melon fruit in Indonesia is known as a vegetable, also traditionally used as sputum urinary, reducing fever and appetite. Bitter melon fruit leaves are used as urinary menstruation, burn injury, drug skin and treat worm disease [2]. Since it is known that bitter melon has medicinal plant to the health so that the researcher is curious to know and isolate the material involve in bitter melon.

Profile of bitter melon fruit on the nutrition is the source of important calorie nutrition. The content of nutrition inside bitter melon fruit per 100 gram BDD (edible part) are: carbohydrate (4,6 g); fat (0,4 g); protein (0,9 g); energy (22 cal); water (93,4 g); dietary fiber (0,9 g); ash (0,7 g); calcium (32,2 g); phosphor (32 g); iron (0,9 g); carotene (80 g); niacin (0,03 g); vitamin C (55 g). Content of vitamin C and carotene are higher if compared with other vegetables such as cucumber which has vitamin C (0, 7 g) and chayote which has vitamin C (18 g), carotene (20 g) [3]. Nutrition profile of bitter melon fruit *(Momordica charantia,* Linn*)* which is full nutrition occur on vitamin and mineral also consists of complex bioactive compound that is beneficial and antioxidant which all contribute to great flexibility in curing the disease. It also consists of saponin steroid having a good role in body activity such as anti-diabetic, anti-hypercholesterolemia, anti-obesity, antitumor, anti-inflammatory, analgesic, antiviral and antidepressant [1].

Full nutrition profile inside bitter melon fruit consisting of bioactive compound is one of the potential functional food sources. Bitter taste available inside bitter melon fruit cause this vegetable uninterested for the consumer. However, this problem can be avoided to reduce the bitter taste through some processes. Bitter melon fruit that was processed into some culinary can reduce bitter taste and rise interest to be consumed. According to [4], processing of food with cooking is a process of application heat on the food material aiming at making the food easily to digest, safe to consume, changing and increasing the performance of the food. Cooking causes changes of component of cell wall plans, such as: 1) protein denaturation, 2) pectate degradation on neutral pH, 3) hydrolysis of glycoside binding hemicelluloses and pectate on pH acid, 4) reaction inter constituent of cell wall.

## II. METHOD

### *A. Material and tools*

The material used in this research is bitter melon fruit taken from the farmer in Kediri Regency, whereas additional food used to make a product are gained from food material store in Malang City. Chemical material and tools to analyze nutrition component consists of glass ware laboratory, such as, measurement glass, Erlenmeyer, funnel dividers, soxhlet apparatus, and biuret used to analyze nutrition component gained from Food Technology Laboratory, Brawijaya University. Tools used to make a product consists of production tools available in Industrial Food Laboratory,

Industrial Technology Department, Faculty of Engineering, Universitas Negeri Malang.

### *B. Method*

The method of making culinary innovation product of bitter melon fruit refered to [5] method, about processing technology of concerning plant with some modification from the researcher. The culinary innovation processing method of bitter melon which is conducted in consecutive order are : crushing of bitter melon material, mixing bitter melon juice with the other component material, forming the shape, steaming, cooling, cutting and drying. The method of nutritious component analysis consisting of protein analysis, fat, carbohydrate, ash content and total carotene follow [6] methods. The calculation analysis of nutrition component is conducted with wet basis component calculation, then converted into dry basis calculation using formula:

$$y = a/b \times 100\%,$$

Remarks:
y = component content (dry basis)
a = component content (wet basis)
b = 100 – water content (on wet basis)

The analysis calculation conversion of wet basis into dry basis is very significant to be conducted so that the data analysis, interpretation, and the discussion are based on the actual amount of component content, regardless the component water content.

### *C. Research Design*

The research is an experimental research of making culinary innovation product of bitter melon fruit with parameter test of measurement protein content, fat content, ash content, water content, carbohydrate, and total carotene of fresh bitter melon fruit and culinary innovation product of bitter melon fruit. The analysis of data finding was done using quantitative descriptive statistic.

## III. RESULT AND DISCUSSION

Processing of culinary innovation product of bitter melon fruit was done using the following method: 1) destroying bitter melon fruit, 2) mixture of destroyed bitter melon fruit with other material, 3) shaping for printing, 4) steaming, 5) cooling, 6) cutting, and 7) drying. Culinary of bitter melon fruit often found in society or community were fast food using steam processing method, making culinary of bitter melon fruit such as siomay; boiling process example chilly sauce boiling (*sambal godog*) and bitter melon fruit curry; sauting process example bitter melon fruit sauted [7]. Product of culinary innovation of bitter melon fruit in this research uses steaming process method, but the result of this steaming process cannot be directly consumed. It still needs the following process that is, cooling, cutting and drying. The product that can be produced from this process belong to *krupuk* product because the next process of this are still added other material having sufficient high starch content such as tapioca, wheat flour, cassava flour or sago flour aiming at gelatinization in steaming activity. The complete gelatinization process followed by the optimal drying process can produce good quality *krupuk* product involving swelling force and crispy [5]. The anylisis result of nutritious component content of culinary innovation product of bitter melon fruit and its fresh fruit is presented in table 1. While the nutrition component content after processing is presented on figure 1.

TABEL I. COMPOSITION COMPONENTS OF CULINARY INNOVATION PRODUCT OF BITTER MELON FRUIT AND ITS FRESH

| No. | Nutrition components | Culinary innovation product | fresh bitter melon fruit |
|---|---|---|---|
| | | (%) | (%) |
| 1. | Protein | 1.08 ± 0.03 | 1.02 ± 0.14 |
| 2. | Fat | 0.0 ± 0.00 | 0.18 ± 0.11 |
| 3. | Ash | 1.6 ± 0.17 | 0.55 ± 0.14 |
| 4. | Water | 13.06 ± 0.28 | 93.56 ± 0.28 |
| 5. | Carbohydrate | 84.26 ± 0.85 | 4.69 ± 0.14 |
| 6. | Total carotene | 0.0078 ± 0.00 | 3.4 ± 0.28 |

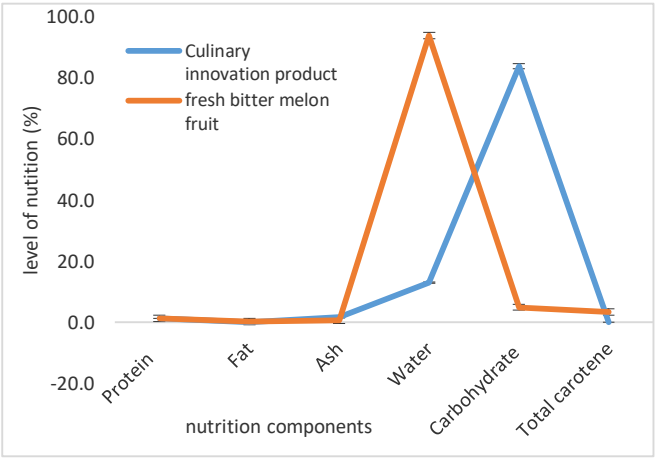


Fig. 1. Composition components changes

Protein content of bitter melon fruit culinary innovation product 1, 08% is higher than protein content of bitter melon fruit 1.02%. The component content of nutrition of culinary innovation product of bitter melon fruit that is higher than nutrition component content of fresh bitter melon fruit are ash and carbohydrate content.

Figure 1 shows us the nutrition component tendency of the bitter melon innovation product and the fresh bitter melon. Each of ash content in a series of culinary innovation product of bitter melon fruit and its fresh is 1.6% and 0.55%, whereas carbohydrate content of culinary innovation product of bitter melon fruit and its fresh each is 84.26% and 4.69%. The higher amount of bitter melon culinary innovation product ash content than the fresh bitter melon shows us that the culinary innovation product has potential to contain the higher amount of mineral compared to the fresh one. The mineral is minor component which is essential on the process of metabolism.

So, its presence on certain type of food material signify that the food material could have a potential to be functional food material. The higher protein, ash and carbohydrate content and the higher use of other product exceeding the number of bitter melon fruit material itself. Material addition meant is cassava starch having protein content, ash content and carbohydrate content composition higher than bitter melon fruit [8], while water content decreases 86 % bigger. The decrease is caused by the existence of drying in processing time of culinary innovation product of bitter melon fruit. The drying process makes the loss of water inside the material due to evaporation process [9]. While it aims at preservation, the more important of drying process is creating retro gradation process of carbohydrate of starch material added to the process of making culinary innovation product. The process is needed after the starch is gelatinized due to heating process with steam on steaming process [5]. 13.06% water content by waterproof packing is the safe water content in storing process of this product. The fat content of this product (0.0%) is lower than fresh bitter melon fruit (0.18%). The lower fat content of this product is caused by the percentage of fat content of fresh bitter melon fruit to be smaller after being added with other material in processing the product in which material added does not consist of fat component.

Carotene is one of important source components in functional food material and it is one of sources to form vitamin A that has a role to the health of eyes, skin, hair, immunity and hardness to infection, bone strength, and prevention of anemia [10]. Total carotene content of culinary innovation product of bitter melon fruit is 0.0078% lower if it is compared with carotene content of fresh bitter melon (3.4%). It is caused by the loss of carotene content during processing. Carotene has insoluble water so that the potential loss of carotene content in washing process or soaking can be minimized. However, carotene is sensitive towards oxygen and light. Existence of double bound in chemical structure, carotene makes it sensitive towards oxidation reaction when there is air, light, peroxidation and heat during processing [11]. On the condition oxidation, carotene will be damaged on high temperature through thermal degradation so that it causes carotenoid decomposition that causes the decrease carotene color intensity [12].

## IV. CONCLUSION

There is a decrease or increase of changes of nutrition component content due to the processing toward culinary innovation product if it is compared with nutritious component content of fresh bitter melon fruit. The changes of carotene content as one of functional food source materials on the process of culinary innovation product decrease. However, the existing carotene content can be used as functional food source material. The follow up activity of the research can be done through the fortification to strengthen the potential of innovation product in bitter melon fruit as one of functional culinary sources.

## ACKNOWLEDGMENT

This study was performed in the Food Industrial Laboratory of the Department of Industrial Technology, Universitas Negeri Malang, Jawa Timur Timur, Indonesia and authors are gratefull to the department for equipment support.

## REFERENCES

[1] Kumar, R.S., J.Ashih, N. Satish. Momordica charantia Linn. A Mini Review. International Journal of Biomedical Research 2(11): 579 – 587. 2011.

[2] Pramono, S., Ngatijan, Soedarsono, S., Budiono, Pujoarianto, A., "Indonesian Traditional Medicine I," Unpublished.

[3] Anonymous, Raintree Nutrition, Inc. Carson City, NV 89701, 2004.

[4] Sudiara, B. P., "Tata Boga," unpublished

[5] Muchtadi, T.R., "Food Processing Technology Vegetable," unpublished

[6] AOAC, *Official Methods of Analytical*. Association of Official Analysis Chemists: Washington DC, USA. 1980.

[7] Hilda, N. H.," The Influence of Processing Methods on The Level of β-Carotene Fruit Pare," unpublished

[8] Ellison, A.C., Carbohydrates in Food, 2nd ed., CRC Press: New York, 1996, pp. 347-429.

[9] Dressoir, "The Technology of Food Preservation," Unpublished

[10] Azrimaidaliza, Vitamin A, Imunitas dan Kaitannya dengan Penyakit Infeksi. Jurnal Kesehatan Masyarakat 1(2): 90 – 96. 2007.

[11] Belitz, H.D. and W. Grosch, 2009. Food Chemistry, Springer Verlag-Berlin Heidelberg. New York.

[12] Erawati Christina, Kendali Stabilitas Karoten Selama Proses Produksi Tepung Ubi Jalar (Ipomea batatas, L) Skripsi (Online) Sekolah Pasca Sarjana Institut Pertanian Bogor, bab 4:16-20. April 2010.