ISBN : 978-602-14917-9-9

IMPLEMENTATION OF GOOD MANUFACTURING PRACTICE (GMP) ON COCONUT PALM SUGAR PROCESSING AT CRAFTSMEN BUSINESS GROUP IN WONOSOBO-BANYUWANGI VILLAGE AS A HELICOS CENTER

Elly Kurniawati [1)], Rinda Nurul K[2)], Arinda Lironika S[3)], Prawidya Destarianto[4)]

[1)]Lecture of Food Industrial Technology Study Program, State Polytechnic of Jember
[2)]Lecture of Medical Record Study Program, State Polytechnic of Jember
[3)]Lecture of Nutrition Clinic Study Program, State Polytechnic of Jember
[4)]Lecture of Informatics Engineering Study program, State Polytechnic of Jember Jl. Mastrip Kotak Pos 164 Jember

Abstract. The partner village development program (PPDM) has been carried out about the production of palm sugar from coconut sap in the village of Wonosobo, Banyuwangi Regency as a college partner. This activity is intended to assist government programs in the development of coconut sugar products into Healthy Coconut Sugar (Helicos) products.The activity aims to increase knowledge and skill of crafment to produce coconut palm sugar based on the standards of Good Manufacturing Practice (GMP) and Hazard Analysis and Critical Control Poinst (HACCP). Community service is carried out by coaching partners through diversification of coconut sugar products into Helicos ants, improving product quality by applying hygine-sanitation, occupational health and safety (OHC) during harvesting, processing and packing. The result showed that the activity : 1) knowledge of craftsmen GMP and HACCP are good, but implementation of GMP and HACCP on coconut palm sugar processing at Wonosobo village can not fully implemented. 2) ability to produce coconut ants sugar by crystallization method using a crystalliser, cabinet driyng and grinding machine and packing mechine. 3) craftsmen understanding of the importance of joint centures in groups is good. The use of tools or machines in the manufacture of coconut ants sugar will help increase production capacity, and maintain the quality of palm sugar. These is expected increase income, consumer acceptance and expand marketing. The proximate analysis of the coconut palm sugar by randoms sampling for three time production showed the contains 2,55% moisture, 1,81% total ash, 0,6 % crude fat, 0,28% crude protein and total solid was 48,6%. Glicemic index of coconut palm sugar was 53, while the crytal sugar was 100. Sensory analysis by preference level showed that coconut palm sugar had likely score for color, odor, taste and texture.

Keywords: coconut palm sugar, glicemic index, proximate analysis

I. Introduction

Indonesia had land area for coconut plants reaching 2.870 million ha from the total area of coconut plants in the world which was 11.909 million ha (BPS, 2017). Most of the coconut plants were used as a producer of roomie which was the raw material for making coconut sugar. The production capacity of coconut sugar reached around 120,000 tons per year (Suliyanto et al, 2012).

One of product diversifications of roomie was coconut palm sugar. Based on information of the Minister of Industry (Menperin) showed that Indonesian palm sugar products were increasingly in

ISBN : 978-602-14917-9-9

demand by the international market with an export value reaching 48 thousand US dollars in 2017 from only 34.7 thousand US dollars in 2014 (Kompas, 2018). Palm sugar could be relied upon to replace cane sugar. Palm sugar products had several advantages compared to coconut sugar, such as: longer shelf life, higher selling prices, easier packaging and transportation because it was more concise, and had more distinctive taste and aroma (Mustaufik and Haryanti, 2006).

Banyuwangi was one of the districts included in the National Priority Rural Area (KPPN) location list. One of the superior potentials of plantation production which was increasing in Banyuwangi was the available land for coconut was 10,872 ha. Until now, the production of coconut sugar had not been developed yet, only 1% of the industry in the region of the total industrial areas (BPS, Banyuwangi Regency, 2015). Wonosobo was one of the villages in Srono sub-district that had a great potential in increasing the production and marketing of coconut sugar because it was supported by abundant coconut production. However, there was no home industry to produce palm sugar in Wonosobo.

In this current condition, coconut sugar production in Wonosobo was still aimed for the capacity of local factory stocks and local market needs. The society was less aware of the importance of developing the potential for palm sugar production. The basic problem was the lack of knowledge and technology used in the processing of the roomie into palm sugar, product packaging and marketing. In addition, the minimal number of human resources and the inadequate number of community groups were already in developing palm sugar production.

Besides, to be able to increase the economic value and storability, coconut palm sugar had other advantages in the health which had a low index gligemic value (IG) compared to sugar (sucrose). The low IG value was very beneficial for health, especially for people with type 2 diabetes mellitus. Therefore, the innovation of making palm sugar in Wonosobo Village was potentially to become a center for Healthy Coconut Sugar (HELICOS) products.

The partner village development program aimed to: implement the results of higher education research in the field of food and health, improve the welfare and living standard of the community through diversification of coconut sugar products into Helicos palm sugar, educate business owners and consumers about the benefits of Helicoss products as alternative dietary options for diabetics and to actualize Wonosobo village in Banyuwangi become Helicos center.

II. Target and Output

2.1 Activity Target

The target to be achieved from the activities carried out below:

a) The application of the results of university research to the community of Wonosobo village, Srono Subdistrict, especially to coconut sugar business owners, were in the form of product composition test results. Product composition tests included chemical compositions such as water contents, protein levels, fat levels, carbohydrate level, sucrose levels, sugar reduction levels, ash contents, energy and water insoluble material. Besides, the quality of coconut palm sugar could be analyzed from the physical properties such as the intensity of the brown color and storage. Glycemic Index (IG) and Glycemic Load (BG) testing were also carried out to assess the potential of palm sugar as an alternative sugar for sufferers of diabetes mellitus types.

b) The understanding enhancement, ability and skills of human resources in the production and packaging process of Helicos (Healthy Coconut Sugar) products based on the HACCP method.

c) Educate potentials in terms of health to business owners and consumers (surrounding communities) through stake holders in health care facilities, villages and districts regarding the benefits of Helicos products as an alternative dietary option for sufferers of Diabetes Mellitus type 2.

ISBN : 978-602-14917-9-9

d) Production development was carried out by creating innovations of existing products by *repacking and relabelling* which were the efforts to renew packaging and labels of products completed with the informations related to the nutritional value and the inclusion of expired dates of products so that the safety of their consumption values was guaranteed.

e) Improve marketing strategies through the licensing certification process.

2.2 Activity Output

1. The understanding enhancement and skills of Partners' human resources in the Helicos production process by structuring the houses of production which approaching to the standards of GMP, HACCP, K3, Hygine sanitation.

2. The application of research results:

a. Chemical composition such as water content, protein, fat, carbohydrates, sugar reduction, ash contents.

b. Glycemic Index Testing (IG).

3. Education of Helicos potential in the health sector to business owners and consumers (surrounding communities) through stake holders in health care facilities, as an alternative dietary option for sufferers of Diabetes Mellitus type 2.

4. Production development by *repacking and relabelling*.

5. Improving the marketing strategy through the licensing certification process.

III. Method of Implementation

In implementing the partner village development program, it was carried out in several steps, such as:

1. Stage one, improving the quality of production through the research results of technology application in the health sector. Training on making HELICOS in a healthy manner with the application of PPE (Personal Protective Equipment) and Sanitation Hygiene based on the HACCP *(Hazard Analysis and Critical Control Point)* method.

2. Stage two: increasing marketing of coconut sugar production results by starting potential education activities in terms of health to business owners and consumers, through testing the product composition, counseling the nutritional value of coconut sugar HELICOS (Healthy Coconut Sugar) as an alternative sugar diet option which was safe to be consumed by the sufferers of Diabetes Mellitus type 2. Production development is carried out by creating an innovation of the existing products by *repacking and relabelling* which was an effort to renew packaging and labeling of the product completed with the informations related to the nutritional value and inclusion of the expired date of the product so that the safety of their consumption values was guaranteed.

3. Stage three is the final stage of plan in the second year activity, which was in the form of improving marketing strategies through the licensing certification process. Assist the organic certification process for coconut sugar. Product certification was needed for the legality of *healthy coconut sugar* products of Wonosobo village community by overseeing registration at the Organic Certification Institute until the product certificate was issued.

ISBN : 978-602-14917-9-9

IV. Results and Discussion

A. The Application of coconut palm sugar Product Research Results (Chemical, Physical, Glycemic Index and Sensory Analysis)

The chemical analysis of the samples was taken randomly on 3 different times of production. The analysis was carried out in the Food Analysis Laboratory at Jember State Polytechnic. The results of chemical analysis can be shown in Table 1 as follows:

No	The Types of Analysis	Mean (%)
1.	Water content	2,55
2.	Ash content	1.81
3.	Fat levels	0,60
4.	Protein levels	0,28
5.	Solids total	48,62
6.	Sugar reduction	2,85

Testing the glycemic index (IG) to provide information about the glycemic response of palm sugar to an increase in blood sugar levels if it was consumed. This test was carried out on healthy *volunteers* and given by the palm sugar intake (treatment) compared to standard sugar intake. The glycemic index of coconut sugar was calculated based on the area under the curve in the blood glucose response curve by the IAUC method. The IG value on the palm sugar was tested from the three palm sugar production samples was 53, which had a low category of GI. Based on organoleptic test results on the preferred level of coconut palm sugar produced showed that the color, taste, aroma and texture quality attributes had a score of 4.23; 4.25; 3.88; and 4, which meant that the product was preferred by panelists.

B. GMP and HACCP Training on Palm sugar Manufacturing

Training on GMP and HACCP in the manufacture of coconut palm sugar by providing an explanation, especially on how to make coconut palm sugar from roomie that fulfilled the standards. The stage was begun by tapping the roomie, cooking the roomie, cooling down, crystallization, drying, and reducing the size to packaging.

ISBN : 978-602-14917-9-9

C. The Application of HACCP

To support the application of sanitation in coconut palm sugar production, it also needed to be understood about the personal hygiene including the health and clean habits of the craftsmen as workers. The sanitation of workers was an aspect that still needed to be improved because the producers of palm sugar were dominated by people with a low level of education and economy, so they pay less attention to *performance* and sanitation while producing the palm sugar.

The buildings' construction of coconut palm sugar production was generally still in the buildings without walls, dirt floors and without chimneys. Buildings without walls so that smoke was arising from the burning process of wood could be blown off immediately which could be seen in Pictures 1.

Pictures 1. Production place before and after training

Based on the results of activities carried out on coconut palm sugar craftsmen from roomie in Wonosobo, it could be concluded that the craftsmen' knowledge about the aspects of Good Manufacturing Process (GMP) and Hazard Analysis and Critical Control Points (HACCP) had increased as indicated by the ability of craftsmen to explain stages of making crystalline coconut sugar according to the standard.

The improvement of craftsman skills in the application of GMP and HACCP had increased as indicated by the ability of the craftsmen at the time of the practice of making palm sugar. However, the application of GMP and HACCP in the palm sugar industry could not be fully implemented due to various limitations possessed by the craftsmen.

The understanding of the importance of cleanliness and sanitation in building construction was increasing. This was shown in the making of the dividing wall which originally came from a dirty and brittle brick. It had been renovated to support the fulfillment of hygiene and sanitation requirements in palm sugar production. The walls were made of painted plywood so that they seemed to be clean and were able to separate the palm sugar production room from the banana field and the place where firewood was used.

Other conditions such as washing facilities and drains were still very minimal. Washing place without drainage, where wastewater was allowed to soak in the ground around the water source or the washing place. Unclean conditions and without a permanent floor so that the environment became muddy which had the potential as a microbiological hazard from water contamination. This can be seen in Pictures 2.

ISBN : 978-602-14917-9-9


Pictures 2. Water sources before and after training

D. Training and Practice of Palm Sugar Packaging Tool

In the training of packaging of palm sugar was given by lecture method and demonstration method. The material about the introduction of types of packaging materials, the selection of packaging materials and the determination of packaging materials that matched to the products produced.

The next explanation was about packaging design, which packaging design had an important meaning in providing information about products and promotional tools that could be a consumer attraction. The requirements stated on the label such as product name, weight, date of manufacture and expiry date and product usability. Furthermore, an explanation and practice were given on how to and stop the operation of the equipment and how to care it. Photos of the activity could be seen in Picture 3.

Picture 3. Actual Packaging

The activity above was filling the product sample into the packaging material by pouring the palm sugar product into the package, then weighing the product weight using a scale. The weight size of the packaged material was adjusted to market demand because the packaging material could be made as needed. As for the regular demand, palm sugar craftsmen provide 250 g and 500 g packages by using attractive and labeled packaging as shown in Picture 4.

ISBN : 978-602-14917-9-9

Picture 4. Types of Packing

E. Counseling about the Benefits of Palm sugar for Health

In this counseling also provided leaflets which was contained the benefits of palm sugar for health and information on the nutritional value of palm sugar. It also provided by the information on organoleptic properties, such as the level of panelists' preference for palm sugar. The mean value showed that the aroma, taste, color and texture were in the like category. It meant that the palm sugar product produced by Wonosobo village as Helicos center could be accepted by consumers. Figure leaflet could be seen in Picture 4.

Picture 4. Extension Leaflet

F. Conclusions and Suggestions

5.1 Conclusions

a. Partners involved in PPDM activities were able to innovate by understanding how to produce new products namely HELICOS by implementing a reference system that approached GMP and HACCP.

b. Sugar craft partners and communities around Wonosobo village got benefits and additional insights after participating in training and mentoring.

c. The donated equipments were very useful in supporting the business, especially the development of product innovation and improvement in terms of sugar production capacity.

5.2 Suggestions

a. The tools maintenance was needed to maintain hygiene and extend life *(life time).*

b. Further recognition about HELICOS was needed by the public or potential customers, so that the product could be more widely known.

I. Acknowledgments

For the implementation of the partner village development program (PPDM) in the second year, hereby expresses our gratitude to the Directorate of Community Service and Research, the Directorate General of Strengthening Research and Development, the Ministry of Research, Technology and

ISBN : 978-602-14917-9-9

Higher Education had provided 2019 funding for community service programs so that activities could be carried out well.

II. References

[1]. Badan Pusat Statistik. 2018. *Produksi Tanaman Perkebunan Menurut Propinsi dan Jenis Tanaman, Indonesia.* https://www.bps.go.id/dynamictable/2015/09/04/839/produksi-tanaman-perkebunan-menurut-propinsi-dan-jenis-tanaman-indonesia-000-ton-2012-2017-.html (Diakses 1 September 2018)

[2]. Badan Pusat Statistik Kabupaten Banyuwangi. 2015. *Statistik Daerah Kecamatan Srono. Banyuwangi.* https://banyuwangikab.bps.go.id/website/pdf_publikasi/Statistik-Daerah-Kecamatan-Srono-Tahun-2015--.pdf (Diakses 1 Agustus 2017)

[3]. Mustaufik dan Haryanti, P. 2006. *Evaluasi Keamanan Pangan dan Penyimpangan Mutu Gula Kelapa Kristal di Kawasan Home Industri Gula Kelapa Kabupaten Purbalingga*. Lembaga Penelitian dan Pengabdian Kepada Masyarakat UNSOED.

[4]. Pitoko, RA. 2018. Melonjak 27 *Persen, Ekspor Gula Semut Nasional Capai 48.000 Dollar*. https://ekonomi.kompas.com/read/2018/05/09/110000926/melonjak-27-persen-ekspor-gula-semut- nasional-capai-48.000-dollar-as. (Diakses 1 September 2018)

[5]. Suliyanto, Suroso, A, Rosyad, A, Rokhman, A, Budiarti, L dan Jati, D.P. 2013. *Usaha Mikro Kecil dan Menengah (UMKM) Gula Kelapa: Potensi, Masalah dan Teknologi*. UPT Percetakan UNSOED.