Short Communication

Hazard analysis and critical control points (HACCP) in palm oil processing to improve the productivity and food quality of palm oil vegetation in Perak, Malaysia

Análisis de Peligros y Puntos Críticos de Control (APPCC) en el procesamiento de aceite de palma para mejorar la productividad y la calidad alimenticia de la vegetación de aceite de palma en Perak, Malasia

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ABSTRACT

Palm oil processing in Malaysia is the home-grown technology which mainly concerned with the highly educated and skilled person, but the labourers appointed at working sites are unsuspecting and unhandy. Malaysia was assessed with the Hazard Analysis and Critical Control Points (HACCP) System for enhancement of productivity, safety and high quality economic crop. The complete analysis of working area showed that the hazards subsisted at all stages of the process. Twenty Hazard Points are located and their possible solutions also discussed in our study. These actions taken will increase the skillfulness of manpower, enhanced the crop productivity with high quality, ultimately it will help to achieve the best and sustained agri economy of the country. The protocols highly esteemed for minimizing or eventually eradicating palm oil processing hazards.

Key words: HACCP, Agro waste, carotene

RESUMEN

El procesamiento de aceite de palma en Malasia es la tecnología de cosecha propia la cual es principalmente ocupada por personas altamente educadas y calificadas, pero los trabajadores designados en los lugares de trabajo son confiados y poco manejables. Malasia se evaluó con el Análisis de Peligros y Puntos Críticos de Control (APPCC) para la mejora de la productividad, seguridad y alta calidad de los cultivos económicos. El análisis completo del área de trabajo mostró que los riesgos subsisten en todas las etapas del proceso. Se encontraron 20 Puntos de Peligro y se discuten también sus posibles soluciones en este estudio. Estas acciones tomadas aumentarán la habilidad de la mano de obra, mejoraran la productividad del cultivo con una alta calidad, en última instancia, ayudará a lograr la mejor y sustentable agroeconomía del país. Los protocolos de gran estima para minimizar o eventualmente erradicar los peligros del procesamiento del aceite de palma.

Palabras clave: APPCC, residuos de la agricultura, caroteno

INTRODUCTION

Palm oil plantation in Malaysia was ancient, first palm oil variety Dura was cultivated in Malaysia in 1875. Its first commercial plantation was organized in 1917, world palm oil market was engaged by top producer of that time, Nigeria and Zaire (Zuur, 2004). The world palm oil production of Indonesia 42% and Malaysia 46% was according in 2007 report. In 2008, report of Malaysian German Chamber of Commerce showed Thailand, 1%, Papua New Guinea 1%, Indonesia 43%, Malaysia 45% and other 10%. However, Malaysia became the second largest exporter with 45% and Indonesia is first with 46% of total world production (MGCC, 2009).

The oil palm fruit is reddish in colour and about a size of plum, but it grows in large bunches. One bunch usually weighs between 10-40 kg. Each fruit consist of a single seed (the palm kernel) and surrounded by soft enriched oily pulp mesocarp. Oil is extracted both from mesocarp and the palm kernel that can be used for the manufacturing edible oil and soap, respectively. The oil palm fruit packed in tight bunch. Fruit start to ripe approximately two weeks after anthesis (WAA). Oil accumulation stated from

12 WAA and end completely by 16 WAA (Oo *et al*., 1985). The types of biomass generated from palm oil industry are empty fruit branch, fiber, shell, palm kernel, frond and trunks (Nasrin *et al*., 2008). Chow (1992) reported the palm oil has maximum vitamin E as compare to other vegetable oil. The colour of crude palm oil is due to the abundance of carotenoids (500-700 mg/L), alpha and beta carotenes are the major component (Cottrell, 1991). One molecules of Vitamin A is produced by each molecule of Alpha and beta Carotene, which is required for normal growth (Olson, 1994). Bester *et al*., (2010) performed experiments on Male Wister rats and concluded that dietary supplement with red palm oil may reduces the myocardial infarct size in an isolated perfused rat.

The palm plantation is the back bone of Malaysian Economy that why many attempts are made to improve the quality of this economical agricultural crop. Our main goal was to explore the hazards and to minimize or eradicate it. Our work esteemed fit to improve the productivity of the crop as well as the economy of the country.

METHODOLGY

The methodology is design for the study of all steps carefully analyzed and explored the hazards and its Critical Control Points. This study not solely helps us to point out and find the problem of hazards but it also helps us to minimize or eradicate from whole operation in palm oil processing. The crude palm oil operation steps are explained in the Figure 1.

RESULTS AND DISCUSSION

The study emphasis on the exploration of Hazards Points and its controlled measure by using Hazard Analysis and Critical Control Points (HACCP) for Malaysian Palm crude oil process, Palm Oil Mill, FELCRA Nasaruddin, KM 37, Jln. Tronoh, Perak. The crude palm oil process is discussed in Figure 1 from palm fruit to oil extraction, drying, packaging and storage. In Table 1 we pointed out the twenty hazards points in different stages of the crude palm oil process and discussed corresponding suitable measure to enhance the quality of crude palm oil. The highly quality production of palm oil initiated from the first step, ripening of fruit, neat clean and minimum damaged Fruits were separated from spikes. Damage and contamination caused of microbial growth on fruits that spoiled and reduced the quality of palm oil. Good and supreme quality of palm oil from fruit depend on the same grade of fruit sorting, that easy be done by noticed the colour of fruit. High quality of fruit is obtained to boil the same grade fruit selected for detachment. Heating procedure basically weaken the fruit attachment point in bunch that caused of loosen and ultimately easy to fall of fruit (Badmus, 1987). Clarification was another critical control point, in this process needed to carefully skim off the residual mixture from crude palm oil. Reheating of oil was another critical point, overheating may lead to the belching of oil which will reduce the β-carotene content. Storage of palm oil in good condition required cool, dry and opaque container, transparent container caused of the lipolysis by the photon of light. Aluminum container may lead to the better shelf life. These handling practices of red palm produced esteemed quality that improved the health of nation and as well as stable the agri-economy of Malaysia.

CONCLUSION

The complete identification of 20 hazard points and its measure will improve the palm oil food grade quality and help in combating against certain diseases. These operations not only improve the crop food quality but also put big hand in country economy.

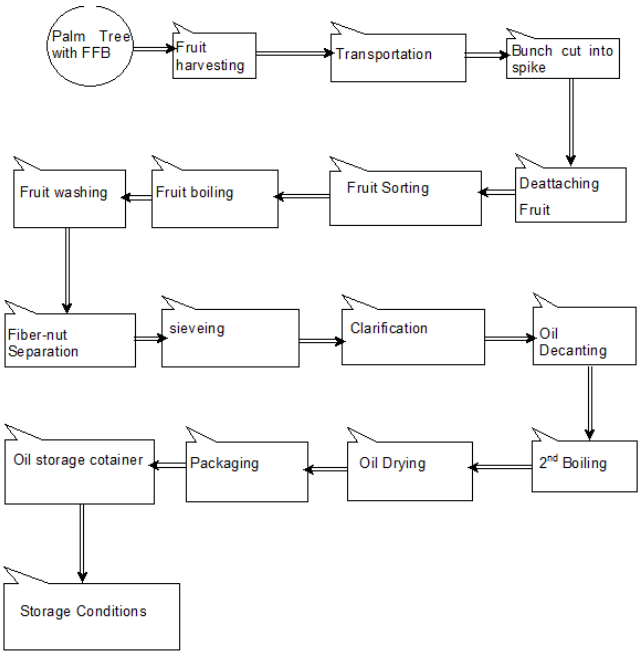

Figure 1. A flow sheet diagram of the crude oil palm processing in palm oil processing in Perak, Malaysia

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Table 1. Locating 20 Hazard Points and their Controlling measure in palm oil processing in Perak, Malaysia.

Process step	Hazard and origin	Control measure
1. Ripening of fruit bunch	Epicarp eaten by birds and insects, endocarp acted as media for microbes, reduce nutrition value	Appointed agronomist and entomologist for regular monitoring before harvesting.
2. Dropping of ripe fruit	Maximum Fruit burst, contaminated with soil dust and microbes	Careful monitoring and harvested before fruit drop
3. Fruit harvesting technique	Pruning from frond, free fruit drop due to increase the FFA	Method may be used for traditional harvesting method to minimize fall (Badmus, 1990).
4. Transportation	Rusted tractor pan used, may reduce the nutrition value of burst palm oil fruit	Food grade quality standard container, skilled labour practices.
5. Separation with cutting of spikes	Fruits damaged during cutting, gave microbial growing points	Careful and skill full cut minimized the microbial risk.
6. Detachment of fruit	Boiling fruit with spike	Washed with hot water to remove dust, high temperature and pressure reduced the lipolytic activity.
7. Fruit sorting	Mixed fruit of different grades.	Separation of fruit grade my noticed the colour and size of fruit.
8. Fruit boiling	Rusted and dusted fruit contamination.	Careful and food grade container for boiling increase the oil quality.
9. Fruit pounding	Open and dirty environment.	Must be close type, reduce the contamination, Personal awareness seminar.
10. Fruit washing	Cold water	Cold washing followed by hot washing to remove oil contamination completely.
11. Fiber-nut Separation	Thick honey like mixture	Pressing and hot water filtration.
12. Sieving	Old colander with scales	Rust and scale free colander used. Skill needed
13. Clarification	Scaly container, inadequate heating	Food grade container, heating to dark foam appear.
14. Decanting Oil	Moisture, slurry with fibers	Heat to remove moisture
15. Second boiling	Engrained dirt and moisture.	Careful collection of dried oil
16. Reheating	May be over heated	Heated time should me monitor
17. Fiber-nut disposal	Jumbled and imprudent dried	Proper monitoring and disposed off for heating.
18. Packaging	Moisture cause Rancidity	Appropriate drying and good handling practices
19. Storage containers	Plastic, glass with transparent bottle, may cause rancidity by oxidation of oil	Amber colour bottle apt for storage to avoid rancidity
20. Storage condition	Hot Environment	For keep good quality must store at cold and moisture free Environment

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