

An Investigation of Stickiness Force of Palm Oil Fruit for Food Processing

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Abstract

Dura and tenera varieties of palm fruit are very popular in production of palm oil and palm kernel, respectively; it becomes imperative to investigate the stickiness forces of the fruit as that may affect the design of machines to handle the processing fruits and also for major agricultural crops. Thus, this study investigates stickiness behavior for the two varieties of palm fruit. An investigation was carried to study the stickiness forces in palm oil fruit for food industry. The sensitive parameters that was considered in this study are dimension of the fruit, work of adhesion, surface free energy, dynamic angle of repose, coefficient of static friction and surface tension. All listed parameters have been individually considered as the sources of stickiness force in the palm oil machinery processes. A mathematical approach takes into account all relevant parameters to predict the adhesive forces value. The mechanical and physical interactions, that would affect the formation and magnitudes of stickiness force in the palm fruit also considered. The finding from this study shows the maximum amount of adhesive forces between the fruit bunches and also between fruit and the contact surface area of the palm oil fruit industry. Apart from that, this study quantified the minimum amount of force needed to detach the fruit bunches and from body of the machine. It is believed that the outcome from this study will provide fundamental understanding on the stickiness forces of the palm fruit that may influence the cleaning and threshing performance to palm oil industries and may benefit researchers, operation engineers and project managers in food industry.

Keywords: *stickiness, palm oil fruit, adhesive force.*

1. Introduction

As stated by Malaysian Palm Oil Board (MPOB) in April 2014, Indonesia and Malaysia produce about 85% of the world's palm oil. Other producer countries such as Thailand, Columbia, Nigeria, Papua New Guinea and Ecuador also produce oil palm as one of their major economics crops [1]. Since Malaysia known as one of the largest producer of palm oil, technology development is very important to improve the number of palm fruit production. Therefore studies in food industry were taken into account and stickiness problem was recognized as one of the most popular problems occurs in food industry long time ago.

In palm oil processing operation, the Full Fruit Bunch (FFB) is gathered and transported by using tractor, lorry and conveyor system to the sterilizer unit. The sterilizer used to increase moisture

Manuscript History:

Received 23 June, 2015, Revised 8 September, 2015, Accepted 10 September, 2015, Published 30 September, 2015