Modeling Palm Oil Quality During the Ripening Process of Fresh Fruits

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Abstract : Experiments were conducted to develop a model for analyzing the ripening process of oil palm fresh fruits in relation to oil yield and oil quality of palm oil produced. This research was carried out on 8-year-old Tenera (Dura × Pisifera) palms planted in 2003 at the Malaysian Palm Oil Board Research Station. Fresh fruit bunches were harvested from designated palms during January till May of 2010. The bunches were divided into three regions (top, middle and bottom), and fruits from the outer and inner layers were randomly sampled for analysis at 8, 12, 16 and 20 weeks after anthesis to establish relationships between maturity and oil development in the mesocarp and kernel. Computations on data related to ripening time, oil content and oil quality were performed using several computer software programs (MSTAT-C, SAS and Microsoft Excel). Nine nonlinear mathematical models were utilized using MATLAB software to fit the data collected. The results showed mean mesocarp oil percent increased from 1.24 % at 8 weeks after anthesis to 29.6 % at 20 weeks after anthesis. Fruits from the top part of the bunch had the highest mesocarp oil content of 10.09 %. The lowest kernel oil percent of 0.03 % was recorded at 12 weeks after anthesis. Palmitic acid and oleic acid comprised of more than 73 % of total mesocarp fatty acids at 8 weeks after anthesis, and increased to more than 80 % at fruit maturity at 20 weeks. The Logistic model with the highest R^2 and the lowest root mean square error was found to be the best fit model.

Keywords : oil palm, oil yield, ripening process, anthesis, fatty acids, modeling

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