Modeling of Oil Expression from Palm Kernel (*Elaeis guineensis Jacq.*)

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Abstract

Moisture content, duration and temperature of roasting are some of the critical parameters influencing oil expression. Effects of these parameters on palm kernel (*Elaeis guineensis* Jacq.) were determined to develop model equations. A 4 x 4 x 4 factorial design was used in the test resulting in a total of 64 samples. Each sample at moisture content 4.5, 5.9, 10.4, and 15.2 % all on wet basis (wb) and were roasted for 5, 10, 15 and 20 minutes each of which was carried out at temperatures of 70, 90, 110 and 130^{o}C . Data were analyzed, employing multiple regression technique to generate mathematical model. Adequacy of the model was authenticated by coefficient of determination R^2, F test and residual analysis criteria. The results obtained showed that oil yields decreased steadily with increase in moisture content . Increase in duration and temperature of roasting produced un-steady rise in oil yields . The maximum oil yield recorded was 47.0 % of the raw material equivalent to 94.7 % efficiency of oil expressed. This was achieved at kernel moisture content of 4.5 % wb, 5 minutes roasting duration and 130 oC roasting temperature. Mean oil yield was 25.8 % of the raw material. Coefficient of determination R^2 at 95 % confidence level of the predictive model was 86 %, probability of prediction F, was 37.2 %. Moisture content influence is the most significant.

Keywords: Palm kernel, oil expression, screw press, moisture content, roasting duration, roasting temperature, modeling.