

Development of imaging application for oil palm fruit maturity prediction

Abstract

Color is the most important indicator for the farmer to determine fresh fruit bunches (FFB) for oil palm fruit maturity in manual harvesting process. To automate the harvesting operation, the development of vision system will replace the human eye for matured FFB recognition. In real plantation environment, the variations of the daylight cause changes the light intensity, thus becoming the main issue that affects automatic recognition process. In this study, the relationships of mesocarp oil content and fruit ripeness were determined. Research was carried out by taking the picture of the oil palm fruit from the days after pollination stage (immature) until overripe stage. The samples were collected from oil palm age of 5, 16 and 20 years tree at MPOB –UKM Research Station, Bangi Lama. The variety of oil palm is Tenera (Dura X Pasifera). These images of 3 categories fruits were captured with setting image parameter and the lighting intensity under oil palm canopy that affected the image was simultaneously recorded in unit of Foot Candles (FC). The sample of fruits were analysed for its oil content at every stage of growth. NIKON coolpix4500 digital camera with tele-converter zooming device was used to capture the image of the fruit which were analysed for its digital color value. The lighting intensity was recorded using Extech Instrument Datalogging Light Meter. The Soxhlet Extractor machine was used to determine the oil content of the fruit mesocarp based on the experiment of Bunch Analysis procedure. The objective of this project is to develop the database of images of oil palm fruit bunches at different stages of fruit maturity. The data will then be used to develop the software to enable the planters to determine the time of harvesting the matured fruits. Initial result tests on 16 years old tree showed that digital value of optical properties was significant in determining the oil content of mesocarp palm. Using regression analysis of polynomial 2nd order method shows that optical property of oil palm fruit was significant in determining the oil mesocarp fruit with respect to its degree of maturity with correlation of equation; $Y = -0.0074X^2 + 3.6351X - 374.06$; $R^2 = 0.9541$ where Y = Mesocarp oil content; X = Hue value and R² = Regression Squared respectively. To estimate the Optimum days for harvesting the FFB, the triangulation method will apply to the data collected from an experiment.

Keyword: Oil; Palm; Prediction