

Determination of moisture content in oil palm fruits using a five-port reflectometer.

ABSTRACT

This paper presents the development of a PC-based microwave five-port reflectometer for the determination of moisture content in oil palm fruits. The reflectometer was designed to measure both the magnitude and phase of the reflection coefficient of any passive microwave device. The stand-alone reflectometer consists of a PC, a microwave source, diode detectors and an analog to digital converter. All the measurement and data acquisition were done using Agilent VEE graphical programming software. The reflectometer can be used with any reflection based microwave sensor. In this work, the application of the reflectometer as a useful instrument to determine the moisture content in oil palm fruits using monopole and coaxial sensors was demonstrated. Calibration equations between reflection coefficients and moisture content have been established for both sensors. The equation based on phase measurement of monopole sensor was found to be accurate within 5% in predicting moisture content in the fruits when compared to the conventional oven drying method.

Keyword: Five-port reflectometer; Coaxial sensor; Monopole sensor; Graphical programming; Moisture; Data acquisition.