

Modelling hourly air temperature, relative humidity and solar irradiance over several major oil palm growing areas in Malaysia

ABSTRACT

Hourly values of air temperature, relative humidity and solar irradiance are often not available in most of the oil palm growing areas in Malaysia, thus limiting research in studying how these weather variables affect oil palm growth and yield. Therefore, a study was carried out to determine the accuracy of some selected models to estimate hourly values of these weather variables in six major oil palm growing areas in Malaysia. Using daily maximum and minimum temperatures, hourly air temperature was estimated. Together with mean hourly dew point temperature, the estimated hourly air temperature was used to simulate hourly relative humidity which was subsequently used to estimate hourly total solar irradiance. The mean absolute error, root mean square error and Willmott's index of agreement within a 24-hr period for air temperature ranged from 0.5°C-0.7°C, 0.6°C-1.0°C and 0.81-0.84, respectively; for relative humidity ranged from 0.8%-1.5%, 1.0%-2.0% and 0.88-0.93, respectively and for total solar irradiance ranged from 83-139 W m⁻², 109-178 W m⁻² and 0.66-0.75, respectively. These models thus could be used to simulate hourly air temperature, relative humidity and solar irradiance in the six major oil palm growing areas in Malaysia.

Keyword: Modelling; Oil palm; Weather variables