Siriphan Leepipatpaiboon 2007: Estimation of Solar Radiation Use Efficiency in Paddy and Cassava Fields. Master of Science (Watershed and Environment Management), Major Field: Watershed and Environment Management, Department of Conservation. Thesis Advisor: Associate Professor Samakkee Boonyawat, Ph.D. 94 pages.

The estimation of solar radiation use efficiency in paddy and cassava fields were studied in Sukhothai and Nakhon Ratchasima provinces, respectively, during November 2004 to January 2006. Crop growth was divided into 3 periods of cultivation (early vegetative period, actively growing period and before harvest period). The objectives of the study were 1) to compare energy balance and radiation use efficiency (RUE), 2) to study the relationship of biomass, leaf area index (LAI) and absorbed photosynthetically active radiation (PARa) in paddy and cassava fields 3) the results from 1) and 2) will be used as basic data for studying energy balance of other watershed areas with different land uses.

The comparison of energy balance between cassava field and paddy field revealed that the energy balance in cassava field was higher than paddy field. The daily average net radiation (Rn) in cassava field was 14.3 MJ m^{-2} day^{-1} while in paddy field was 13.2 MJ m^{-2} day^{-1}. The Rn was used for latent heat (LE), sensible heat (H) and storage in soil (Gs) with the average values of 9.8, 3.9 and 0.5 MJ m^{-2} day^{-1} for cassava, while in paddy field were 9.5, 3.0 and 0.4 MJ m^{-2} day^{-1}, respectively, and storage in water (Gw) was 0.2 MJ m^{-2} day^{-1}.

In cassava field, the daily absorbed phorosynthetically active radiation (PARa) during actively growing period was the highest (10.99 MJ m^{-2}), the average PARa was 8.98 MJ m^{-2} and the radiation use efficiency (RUE) for cassava was 1.09 – 4.42 g MJ^{-1}. In paddy field, the daily PARa during actively growing period was the highest (9.53 MJ m^{-2}), the average PARa was 6.30 MJ m^{-2} and RUE of rice was 0.58 – 0.66 g MJ^{-1}. Therefore, PARa in cassava field was higher than paddy field. The relationship between biomass and PARa in paddy and cassava fields were linear with the R^2 of 0.97 and 0.89, respectively. Additionally, the relationship between leaf area index (LAI) and PARa in paddy and cassava fields were polynomial with the R^2 of 1.00 and 0.59, respectively.

S. Leepipatpaiboon — Student's signature

S. Boonyawat — Thesis Advisor's signature

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