

Solar radiation and potential evapotranspiration in monoculture and polyculture systems, fallow and primary forest in Western Amazonia

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This study describes the microclimate in different agricultural systems, young fallow and primary rain forest in Western Amazonia, focussing on the absorption of total solar radiation by the tree layer and potential evapotranspiration at soil level. The primary forest absorbed the highest percentage of the solar radiation with only 2.8% of the incoming radiation reaching the soil. In the agricultural systems, the radiation which reached the soil without being absorbed by the useful plants was much higher, corresponding to the lower leaf area in these systems which is an important factor in the absorption of solar radiation. The same was true for the fallow. For estimating the potential evapotranspiration according to Penman in different positions of the investigated vegetation systems, Piche evaporimeters were calibrated against measurements of the Penman evapotranspiration from a nearby automatic meteorological station. This design allowed the estimation of Penman evapotranspiration in a high number of different systems and positions at a much reduced cost. There were pronounced differences in potential evapotranspiration within systems and also within the polyculture plots, with lowest values measured under the Pueraria cover crop. To the estimate of potential evapotranspiration, the energetic term contributed more than the aerodynamic term in the Penman formula, the latter contributed only 11% to the predicted value.