Estimated evapotranspiration of rice based on pan evaporation as a surrogate to lysimeter measurement

ABSTRACT

Reference crop evapotranspiration (ET o), used to determine actual crop evapotranspiration, is often estimated from pan evaporation (EP) data. However, uncertainties in the relationship between ET o and EP often result in unreliable estimate of crop evapotranspiration. This study investigated the relationship between measured and estimated crop evapotranspirations, ET m and ET e, respectively, at tillering (9ï 30 days after transplanting, DAT) and mid-growth (51ï 72 DAT) stages of a rice variety. ET m was measured with a Marriott Tube-type Micro-lysimeter (hereafter referred to Micro-lysimeter) in a ponded rice field and ET e was estimated from EP, which was measured by employing the US Weather Bureau Class óAô Evaporation Pan (hereafter referred to Class A Evaporation Pan). A strong linear relation (r 2 = 0.89) at the tillering stage and a weak relation (r 2 = 0.48) at the mid-growth stage were obtained between ET m and EP. The slope of this plot provided a pan-crop factor (K p K c), which was 0.81 at the tillering stage and 0.79 at the mid-growth stage. The ET e versus ET m relationship was also strongly linear (r 2 = 0.90) at the tillering stage but weakly linear (r 2 = 0.50) at the mid-growth stage. The pan-based method thus provided reliable estimates of evapotranspiration during the tillering stage of rice.

Keyword: Class 'A' Pan evaporation; Evapotranspiration; Growth stage; Micro-lysimeter; Rice