

Irrigation Science

Crop coefficient approaches based on fixed estimates of leaf resistance are not appropriate for estimating water use of citrus

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Abstract

The estimation of crop water use is critical for accurate irrigation scheduling and water licenses. However, the direct measurement of crop water use is too expensive and time-consuming to be performed under all possible conditions, which necessitates the use of water use models. The FAO-56 procedure is a simple, convenient and reproducible method, but as canopy cover and height vary greatly among different orchards, crop coefficients may not be readily transferrable from one orchard to another. Allen and Pereira (Irrig Sci 28:17–34, 2009) therefore incorporated a procedure into the FAO-56 approach which estimates crop coefficients based on a physical description of the vegetation and an adjustment for relative crop stomatal control over transpiration. Transpiration crop coefficients derived using this procedure and fixed values for citrus did not provide good estimates of water use in three citrus orchards. However, when mean monthly leaf resistance was taken into account, good agreement was found with measured values. A relationship between monthly reference evapotranspiration and mean leaf resistance provided a means of estimating mean leaf resistance which estimated transpiration crop coefficients with a reasonable degree of accuracy. The use of a dynamic estimate of mean leaf resistance therefore provided reasonable estimates of transpiration in citrus.