

JANUARY 05



CIMIS

California
Irrigation
Management
Information
System

Net radiation estimation method performing well

As reported in the October 2004 issue of *Update*, the Office of Water Use Efficiency (OWUE) staff compared reference evapotranspiration (ET_o) and net radiation (R_n) estimated using CIMIS's Modified Penman (CIMIS MP) and the standardized Penman-Monteith (PM) equations. The result showed that differences in ET_o estimated by the two equations are not significant, whereas differences in R_n are significant.

R_n is the net radiant energy that is available at the surface to evaporate water, heat the air and heat the soil. It is either measured using net radiometers or estimated using theoretical and empirical formulas.

Since net radiometers are expensive and difficult to maintain, R_n formulas are usually used to estimate R_n.

ET_o is evaporation plus transpiration from standardized grass surfaces. Crop

factors are used to convert ET_o to actual crop evapotranspiration (ET_c). ET_c is in turn used for irrigation scheduling purposes. Although ET_o can be measured using instruments such as Lysimeters, theoretical and empirical equations are widely used because measurements are expensive.

For efficient irrigation, it is essential that ET_o is estimated as accurately as possible. The accuracy with which ET_o is estimated depends mainly on the accuracy with which the parameters used to calculate ET_o are measured or estimated.

R_n is by far the most important parameter in the calculation of ET_o using the Penman type combination equations. Therefore, it is equally important that R_n is estimated with utmost accuracy.

CIMIS purchased and installed net radiometers near the Davis CIMIS



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station to compare R_n estimated by the two methods against measured values. A preliminary analysis using hourly data from July 17, 2004 through October 24, 2004 indicated that both equations estimated R_n within possible measurement errors. However, the CIMIS MP method provided a better estimate of measured R_n than the PM.

On average, R_n estimated by the PM was eight percent higher than the measured, whereas R_n estimated by the CIMIS MP was four percent less than the measured R_n. This will certainly raise the confidence of CIMIS data users and providers in the quality of the data. The experiment will continue for one year to incorporate the effects of seasonal variability.

For more CIMIS information...

CIMIS information is published quarterly in the CATI *Update* newsletter. Articles are provided by the California Department of Water Resources, CIMIS program staff.

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If you are unable to reach a CIMIS representative near you, call the CIMIS Helpline at 1-800-922-4647.

Weekly ET_o Comparisons for Fresno

Fresno: 09/01/04 – 11/30/04

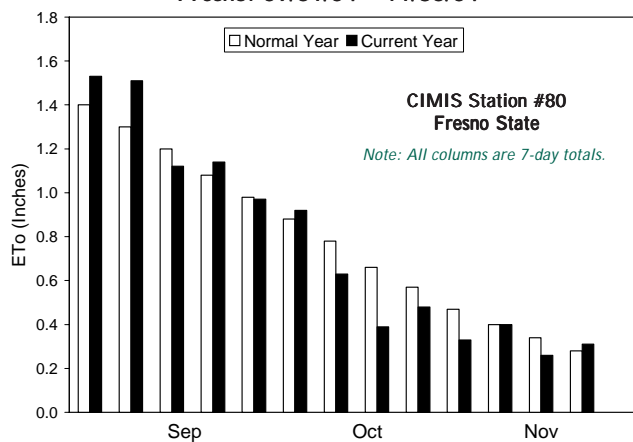


Chart shows ET_o variation from normal over last three months.