

Measuring water use and crop coefficients for full and deficit irrigated crops

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Abstract. As water scarcity increases in irrigated areas, precise scheduling of irrigation timing and amount becomes more critical. Farmers also must consider deficit irrigation as a way to maintain their productivity and income with limited water supplies. The USDA-Agricultural Research Service in Colorado is measuring yields and crop water use with full and managed deficit irrigation, and developing strategies to maximize “crop per drop”. We have set up field plots with several deficit irrigation timings and amounts and closely monitor water applications, soil water content, and crop responses. We develop water production functions (yield per unit water use), plant stress indicators such as elevated canopy temperature and reduced growth, and estimate crop water use by the volume balance method. Deficit irrigation generally does not result in higher water productivity of field crops, but can be used to manage limited water supplies. The volume balance method is an accurate way to estimate crop water use if water applications are uniform and deep percolation is small. Canopy temperature is a good way to estimate crop stress and is closely related to soil water deficit.