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# DEFICIT IRRIGATED CORN ET ESTIMATES USING CANOPY REFLECTANCE AND CANOPY TEMPERATURE

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**ABSTRACT:** Sustainability of irrigated agriculture with declining water supplies is a critical agricultural issue in the US Great Plains. Imposing water deficits on crops during non-critical growth periods is a technique to maximize net economic output per unit of water consumed by the plant. However, irrigation timing and amount determination for such a scenario is not a simple, straight-forward procedure. Monitoring plant growth and plant water stress would appear to be logical input data. Several canopy temperature based irrigation timing techniques exist that determine when to irrigate but do not indicate how much to irrigate. The well known and widely used reference ET-crop coefficient procedure for estimating crop ET of fully irrigated crops would be easiest to implement assuming the procedure could be modified and/or adjusted to estimate crop ET for deficit irrigated crops. Estimated ET from crops grown under non-optimum conditions is typically adjusted through use of a water stress coefficient dependent on available soil water. A potential problem with this approach is inadequate knowledge of soil properties (field capacity and permanent wilting point) due to spatially variable soils within a field and crop rooting depths; hence, there is uncertainty in plant available soil water within the crop root zone. Twenty-five years ago it was shown that the basal crop coefficient for well irrigated corn could be adjusted for anomalous growth conditions using canopy reflectance measured in the red and near-infrared portions of the electromagnetic spectrum. Recently, a ratio of canopy temperatures (canopy temperature of well irrigated corn divided by the canopy temperature of water stressed corn) was shown to have potential as a quantitative water stress coefficient for water stressed crops. Crop ET for deficit irrigated corn will be estimated using a crop coefficient estimated from canopy reflectance data acquired in the red and near-infrared wavebands and the canopy temperature ratio calculated from canopy temperature measured over well-irrigated and deficit-irrigated corn. These ET estimates will be compared to measured ET by the Bowen ratio energy balance method.

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