



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2003NE34B

Title: Defining Dynamic Crop-Water-Stress-Index Baselines to Schedule Irrigation Using Infrared Thermometers

Project Type: Research

Focus Categories: Irrigation, Agriculture, Water Use

Keywords: CWSI, Corn, Soybeans, infrared thermometer, Canopy temperature

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Matching Funds: \$61647.00

Congressional District: 3

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Abstract: Although irrigation is an important component of Nebraska's economy, it has been linked to serious environmental problems, since farmers still irrigate empirically, due in part to lack of practical irrigation scheduling tools. A potentially simple irrigation scheduling method is by measuring canopy temperature using infrared thermometers. It is known that the difference between canopy and air temperatures ($T_c - T_a$) increases when crops are under water stress. This concept has been used to calculate the Crop Water Stress Index (CWSI), which is well related to soil moisture depletion. To calculate the CWSI it is necessary to first establish the ($T_c - T_a$), for a given vapor pressure deficit, expected under water-stressed and non-water-stressed conditions, known as the upper and lower baselines. A few gaps in the current knowledge, however, make the current version of this method impractical for general adoption by farmers. The most important gap is that the baselines change with location, season, and time of day, since they are affected by available energy and wind speed. This has not been properly considered and researchers in different places have reported different baselines for the same crop. This is an important problem since as no universal baselines exist, local calibration is needed before the method can be used. The objective of this project is to develop transferable baselines and functions to relate soil moisture depletion to CWSI for corn and soybeans that will make this method

practical since it will not require local calibration.

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