

EVALUATING DIFFERENT IRRIGATION SCHEDULING METHODS FOR VARIABLE RATE IRRIGATION SYSTEMS IN ALFALFA

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ABSTRACT

Alfalfa is the third most important crop in the US. The water use is high in alfalfa because it has a long growing season, a deep root system, and a dense vegetation canopy. The amount of water needed for alfalfa production depends on temperature, wind, humidity, and light intensity. 33% of land irrigated in Nevada is under center pivots with Variable Rate Irrigation (VRI). This is a precision irrigation technique used to optimize water application within a field by adjusting the amount of irrigation based on various factors, such as soil properties, crop needs, and environmental conditions. This approach helps to manage water resources more efficiently and improve crop yield by delivering the right amount of water to different parts of the field based on specific needs. There are two irrigation Scheduling algorithms in Irrigation Scheduling Supervisory Control and Data Acquisition System (ISSCADAS), namely a plant-stress-based algorithm called integrated (iCWSI) and a hybrid algorithm that uses both iCWSI and hybrid methods. The integrated Crop Water Stress Index (iCWSI) method calculates crop water stress over time by summing theoretical Crop Water Stress Index (CWSI) values obtained during daylight hours. The iCWSI is computed by comparing the difference between canopy (T_c) and air temperature (T_a) to the stress limits (lower limit for well-watered and upper limit for severely stressed crops). The hybrid site-specific irrigation scheduling method integrates data from soil water sensors with the integrated Crop Water Stress Index (iCWSI) to create a feedback loop, aiming to avoid both under and over-irrigation while enhancing the irrigation scheduling within the ISSCADAS system. These two irrigation Scheduling methods are compared with the Soil Water Balance (SWB) method to understand the crop water productivity of these irrigation scheduling methods at Valley Road Field Lab at the University of Nevada, Reno (UNR)

Key Words: Variable Rate Irrigation, ISSCADAS, Precision Irrigation,

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