A DYNAMIC VARIABLE RATE IRRIGATION CONTROL SYSTEM

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Currently variable rate irrigation (VRI) prescription maps used to apply water differentially to irrigation management zones (IMZs) are static. They are developed once and used thereafter and thus do not respond to environmental variables which affect soil moisture conditions. Our approach for creating dynamic prescription maps is to use soil moisture sensors to estimate the amount of irrigation water needed to return each IMZ to an ideal soil moisture condition. The UGA Smart Sensor Array (UGA SSA) is an inexpensive wireless soil moisture sensing system which allows for a high density of sensor probes. Each probe includes three Watermark sensors. We use a modified van Genuchten model and soil matric potential data from each probe to estimate the volume of irrigation water needed to bring the soil profile of each IMZ back to 75% of field capacity. These estimates are converted into daily prescription maps which we downloaded remotely to a VRI controller thus creating a dynamic VRI control system. During 2016, we conducted an on-farm experiment to assess our system. We worked with a producer in a 330ac field in southwestern Georgia. The field was divided into alternating conventional irrigation and dynamic VRI strips with each strip 162 rows wide. The conventional strips were irrigated uniformly based on the producer's recommendations. We divided the VRI strips into IMZs and after planting we installed UGA SSA probes in each of the IMZs. The data from the probes were used to develop daily irrigation scheduling recommendations for each IMZ. The recommendations were converted into a daily prescription map and downloaded remotely to the pivot VRI controller. When an irrigation event was initiated, the VRI-enabled pivot responded dynamically to soil moisture conditions. We will present the design of our dynamic VRI control system and the results from the 2016 study.

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