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Use of Crop Water Stress Index for Irrigation Scheduling of Soybean

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Abstract

Canopy temperature measured with infrared thermometers is an important tool for detecting crop water stress. The crop water stress index (CWSI) is the most often used index which is based on differential of canopy temperature and vapor pressure deficit to detect crop water stress and to schedule irrigation for field crops. The aim of this study is to determine the relationship between the canopy-air temperature difference and the vapor pressure gradient (VPD) to calculate the CWSI value in soybean plants. The study is carried out in randomized complete block design in six different irrigation treatments in three replications. Plots were irrigated when the cumulative evaporation in Class A pan is 25±5 mm using drip irrigation system based on the pan coefficient (k_{pc}) of 0, 0.25, 0.50, 0.75, 1.00, and 1.25. Before and after each irrigation, canopy temperature was measured with a hand-held infrared thermometer in all treatments between 11.00 and 14.00. Throughout the season, before irrigation, soil moisture content was measured. The CWSI values were determined using empirical approach. When using this technique in Antalya conditions, it is suggested to keep the seasonal mean CWSI value approximately 0.26 and index value of 0.40 can be used to start irrigations. Additionally, it is suggested that the amount of irrigation can be determined as much as the amount of evaporation measured until the index value reach 0.40. According to the results obtained, it is concluded that infrared thermometer can be used for irrigation scheduling of the soybean plant in Antalya conditions.

Keywords: Deficit Irrigation, Infrared thermometer, VPD, CWSI,