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Canopy Temperature Depression as a Potential Selection Criterion for Drought Resistance in Texas Wheat

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Field studies were conducted at Bushland, TX, in 2004 to examine the usefulness of canopy temperature depression (CTD), the difference between air and canopy temperature, as a screening tool for yield and stress tolerance in large breeding populations. Forty wheat genotypes were grown under irrigation and dryland. CTD was recorded after heading, between 13:30 h and 15:30 h, on 6 clear days in dryland and 9 clear days in irrigation. Drought susceptible index (DSI) for each genotype was calculated using mean yield under dryland and irrigated conditions. Genotypes exhibited significant CTD differences under each environment. Under dryland conditions, mean CTD was 1.33 OC and CTD values ranged from -0.67 to 2.57OC. Under irrigated conditions, mean CTD was 4.59 OC and CTD values ranged from 3.21 to 5.62 OC. CTD was positively correlated with grain yield for the different reading dates under dryland ($R^2 = 0.79-0.86$) and irrigation ($R^2 = 0.46-0.58$), and negatively with DSI under dryland. Regression analyses suggested that the best time for sampling CTD was 3-4 weeks after heading under irrigation and any time between heading and senescence under dryland. Crop water stress index (CWSI) calculated from CTD data was significantly correlated with CWSI calculated from yield. Our results suggest that grain yield and water stress can be predicted by CTD in this environment, but need to be confirmed by additional years of data.