

## Using a High Resolution Thermal Infrared Camera to Select Stress-Tolerant Plants

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### BACKGROUND:

Canopy temperature depression (CTD) is well established as a good method to select for drought-tolerant wheat varieties at Bushland, TX. The best CTD sampling times for genotypic and grain yield evaluations from short-term CTD readings have been identified and recently published. However, research suggests for these short-time CTD evaluations, an infrared (IR) thermal camera will work better than traditional IR thermometers. The camera allows sampling of individual wheat rows in a short period of time under similar environmental conditions.

### OBJECTIVES:

- Take CTD measurements in wheat dryland plots and rows with traditional IR thermometers (IRts) and a newly purchased IR thermal camera.
- To compare data obtained from the two instruments and to learn how to use the IR camera for CTD measurements in the most efficient way.

### RESULTS:

The high resolution IR thermal camera is a promising instrument for a more precise evaluation of drought-tolerant wheat lines than traditional IRts. Some of the benefits are:

- More rows sampled at one time: at 4 meters above the plants, 5 rows can be seen; at 8 meters, 10 rows. With traditional IRts, one IRt per row is needed, plus many wires to connect the IRts to a storage module and a power supply.
- Mobility: one camera can be used to take measurements in different fields, locations, states and crops.
- More precise measurements of plants and not soil, shades, and objects: with traditional IRts, it is impossible to be sure you are viewing only plants. Measurement error is increased and sensitivity decreased when soil, shades and other objects interfere with plants.
- More convincing for readers when published, as they can actually see where data are from.
- User-friendly software.
- It can be used for different applications: water use, water, heat and disease stresses, and genotypic selection. Also possible applications with nutrient management and weed control.

