Canopy Temperature Depression as a Predictor of Grain Yield/ Stress Tolerance in Wheat

Maria Balota and William Payne, Texas AgriLife Research-Amarillo

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BACKGROUND:

Canopy temperature depression (CTD) is an easily measured manifestation of crop metabolic and physiologic response to the environment. Among other things, CTD can be used to distinguish stress-tolerant wheat genotypes from stress-intolerant ones. Typically, breeding programs have too many entries to continuously monitor each one for CTD. Instead, they often use periodic sampling schemes with hand-held infra-red thermometer guns.

Information is needed on the optimum time of sampling to obtain the largest probability of detecting genotypic differences. Typically, CTD is sampled at noon when maximum genotypic differentiation is expected. However, we found night sampling is also useful for best CTD-based yield prediction. Information on traits that cause night time CTD is unavailable yet.

RESULTS:

Our data suggest that the optimal time to observe genotypic differences for CTD and to predict yield is both after- and pre-dawn. Further studies are required to confirm the generality of this observation. If confirmed, the ability of modern instrumentation to remotely and automatically measure CTD would make this a practical technique for use by breeders interested in screening for drought or heat stress tolerance.

OBJECTIVES:

• CTD comparisons among three wheat lines previously identified with different response to drought based on grain yield production.

• Identify the morphological and physiological traits related to CTD.

• Determine the optimum time for CTD sampling for the best yield estimation and genotypic differentiation.

(At left) Continuous and automated CTD monitoring in wheat plots.