



California a Single Environment for Common Wheat Adaptation

To maximize the productivity of agricultural systems, it is important for growers to choose crop varieties that are well adapted to their specific production environment, but genotype-by-environment (G×E) effects can complicate the identification of truly superior genotypes. If strong and repeatable G×E effects are present, then it may be necessary to divide a production region into sub-regions that differ consistently in terms of which genotypes are superior. Dividing production regions in this way has drawbacks though because it makes breeding and variety testing more complex. Understanding G×E interaction is therefore necessary for efficient and reliable crop-breeding and variety-testing activities.

In a recently published article in *Crop Science*, researchers from the University of California–Davis report on a study that investigated G×E effects in a long-term yield trial dataset for common wheat. California has historically been divided into a number of sub-regions for the purposes of analyzing and reporting on cereal yield trials, but the team found no consistent differences in how different genotypes were adapted to these sub-regions. Instead, in terms of yield, California is a single environment for common wheat adaptation. Most variation in yield was found to be independent of



Variety trials of common wheat at Davis, CA. Photo by Taylor Nelsen.

genotype and associated primarily with factors like nitrogen management and water availability. Seasonality also interacted strongly with genotype, making yield variation due to G×E effects unpredictable.

The team's findings suggest that the optimal way to identify superior genotypes will be to combine data across all variety-testing locations in the state, and across multiple years, to produce single performance estimates.

Adapted from George, N.A., and M. Lundy. 2019. Quantifying genotype-by-environment effects in long-term common wheat yield trials from an agro-ecologically diverse production region. Crop Sci. 59. View the full article online at <http://dx.doi.org/doi:10.2135/cropsci2019.01.0010>

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