

Public Abstract

First Name:David

Middle Name:Grant

Last Name:Chappell

Adviser's First Name:Anne

Adviser's Last Name:McKendry

Co-Adviser's First Name:

Co-Adviser's Last Name:

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Title:Canopy Spectral Reflectance as an Indirect Selection Tool for Yield in Wheat

Measurement of yield and its components is typically a laborious and expensive process in most wheat (*Triticum aestivum* L.) breeding programs due to the need for large seed quantities and multi-location testing. High-throughput phenotyping for traits that are associated with yield may enable breeders to more effectively select genotypes with high yield potential in earlier generations when genetic diversity may be higher and in a single environment thereby lowering costs. This study was designed to determine the efficacy of utilizing canopy spectral reflectance indices as indirect selection criteria for grain yield and its components in soft red winter wheat. Two experiments were conducted over two crop seasons near Columbia, Missouri, including one with thirty-six genotypes previously selected for high or low grain yield that were arranged in a replicated, randomized complete block design and one with 1AL.1RS and 1BL.1RS wheat-rye translocation, along with respective controls, in three different genetic backgrounds, arranged in a split plot design. Canopy spectral reflectance, chlorophyll, and canopy temperature data were collected on clear days with low humidity during the boot, heading, anthesis, early grainfill, and dough developmental stages and analyzed for their association with grain yield and its components. Spectral reflectance indices measured at anthesis were most closely associated with yield and among those, CI, GNDVI, R760/R730, and R780/R740 were most strongly correlated with grain yield and related components. Coefficients of determination exceeded 0.6 for harvest index and 0.5 for grain number m⁻² and grain yield m⁻². Results of these experiments suggested that these indices may be effectively used as supplemental selection criteria for grain yield and related components in wheat.