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SPECTRAL PROXIMAL SENSING IN PHENOTYPING YIELD TRAITS OF WHEAT GROWN IN DIFFERENT NITROGEN FERTILIZER CONDITION

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Wheat (Triticum aestivum L.) is a staple crop worldwide and yield improvement was mostly attributed to nitrogen fertilizer application. Since that precision nutrient management requires accurate assessment of crop nutrient status, spectral proximal sensing could presents the promising tool for non-destructive methods to estimate plant status and yield traits. In order to estimate the influence of nitrogen applications on variability of grain yield and yield related traits, four winter wheat genotypes (Pobeda, Futura, NS40S and Ingenio) were selected. The wheat genotypes were grown in field trials of control and three nitrogen levels in amounts of 60, 120 and 180 kg of N ha−1. In this research, an active portable multispectral optical device, named Plant-O-Meter, for spectral measurements was used throughout the vegetation season until full maturity of wheat. The device possess an integrated multispectral source of light in four most indicative wavelengths (465, 535, 630 and 850 nm) and allows simultaneously illumination of plant. Large number vegetation indices (VI) based on four spectral bands combinations were calculated to estimate the influence of N supply on yield and yield traits. Across vegetation seasons, phenotypic variability and genotype by environment interaction (GEI) for yield traits of wheat across different N treatment were studied. The additive main effects and multiplicative interaction (AMMI) models were used to study GEI. AMMI analyses revealed significant genotype and environmental effects, as well as GEI effect, while positive correlations between certain VI obtained by the sensor encourage the potential for rapid detection crop nutrient status and its influence on yield using proximal sensing. The results of this study could provide guidelines for rational use of fertilizers, minimize possible harmful effect on environment, as well as in identification of genotypes with stable reaction adapted across environments for the grain yield traits.