Evaluating wheat genotypes tolerant of sodic soil

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In sodic soils, crop yield suffers due to physical and chemical constraints. Identification of sodicity tolerant genotypes is one of the options to improve productivity of these soils. In this project, sodicity tolerance of 36 wheat genotypes widely grown in Australia was assessed at two sites: a control (low sodicity site, ESP= 3) and a sodic site (ESP= 6) situated near Billa Billa, southern Queensland, during 2015. Both the sites contained similar pH range (surface soil >8.0, subsoil <6.5), electric conductivity (0.2-0.3) and other nutrients (Cl and N-NO3). This study aimed to characterize wheat genotypes that would possess combined tolerance to physical and chemical constraints encountered in sodic soils. Emergence, soil moisture content, nutrient uptake in leaves, biomass, hyperspectral reflectance, and lidar data were correlated with grain yield. The grain yield varied significantly among different genotypes at both sites. Due to unusually favourable timing of rainfall, the detrimental effects of sodic soil were reduced. The average yield for all genotypes was 9.5% higher on the sodic soil than the control. Some genotypes (e.g. Flanker) had higher grain yield on the sodic soil than the control. Index leaf analysis at anthesis indicated that genotypes with higher concentrations of Na+ in their leaves had lower yield than other genotypes in both paddocks. Particular genotypes maintained higher concentrations of potassium in index leaves in sodic soil than the control, e.g. Hartog. The control paddock had a higher proportion of undersized grain (screenings) than the sodic. Relating biomass at anthesis with hyperspectral data produced moderately high prediction accuracy, correlation (r2) values ranging from 0.5 to 0.6. With regards to yield, the partial least squares (PLS) regression results show that hyperspectral data are useful in yield prediction. The PLS models produced high correlation values (r2=0.586 to r2=0.755), particularly for data collected during the anthesis stage.