CLASSIFICATION OF EARLY-SEASON MULTISPECTRAL IMAGES FOR LOW-DENSITY WEED DETECTION IN CORN. Jon-Joseph Q. Armstrong, Richard D. Dirks, and Kevin D. Gibson, Graduate Research Assistant, Research Associate, and Assistant Professor, Purdue University, West Lafayette, IN 47907.

Detection of early season weeds at low densities is critical to developing prescription maps for site-specific herbicide application. The objective of this study was to evaluate aerial multispectral remote sensing for detection of weeds in corn. Field plots were established at two sites (ACRE, TPAC) in summer 2005 in a complete randomized block design with eight blocks. One week after planting, common lambsquarters seedlings were transplanted into the plots at four densities (0, 1, 2, 4 weeds m^{-2}). Aerial multispectral images were taken at 3 and 5 weeks after planting. MultiSpec, a remote sensing software package, was used for image classification and images were trained and tested for classification into one of three classes (bare ground, crop, weed). Classified pixels in the final thematic images were counted for each plot and treatments were analyzed with ANOVA. Corn and common lambsquarters could not be reliably detected and differentiated in the 3 WAP image at either site. Differences among treatments were detected at 5 WAP at ACRE ($p=0.1$) and TPAC ($p<0.01$). At both sites, plots containing 4 weeds m^{-2} had significantly more weedy pixels than plots containing no weeds. While at 5 WAP the common lambsquarters plants were slightly beyond the recommended height for glyphosate application, the images could be used for rescue treatments. These results indicate the need for higher spatial and spectral resolution to reliably detect weeds early in the season.

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