USING HIGH-RESOLUTION AERIAL MULTISPECTRAL IMAGERY FOR EARLY-SEASON WEED DETECTION IN CORN. Richard D. Dirks*, Jon-Joe Q. Armstrong, Kevin D. Gibson, Research Associate, Graduate Research Assistant, and Assistant Professor, Purdue University, West Lafayette, IN 47907.

High-resolution images (7.62 cm pixels) in red, green, blue and near-infrared wavelengths can be obtained with a recently developed remotely-controlled unmanned aerial vehicle. Plots to evaluate the value of these multispectral images for detection of early-season weeds at economic thresholds in corn were established at two Purdue University research farm locations in May 2005 (ACRE and TPAC). Plots measured 5-m x 5-m and were arranged in a complete randomized block design with eight replicates at each location for a total of 32 plots at each site. Glyphosate resistant corn was planted in 0.76m rows at 64,250 seeds ha^{-1}. At one week after planting (WAP) common lambsquarters seedlings were transplanted at four densities: 0, 1, 2, and 4 weeds m^{-1}. Imagery was obtained three, four and five WAP and analyzed using the unsupervised ISODATA clustering algorithm in MultiSpec©. Accuracy increased as crop and weeds increased in size. At 5 WAP (V8 corn, 43 cm tall weeds), all weed densities were significantly different from the weed-free plots, according to ANOVA followed by LSD. Although the corn was within the range for labeled herbicide application at 5 WAP, weeds were larger than recommended for optimal control. This is the first study we have conducted using this new technology and believe this imaging method has merit for obtaining economical high resolution images for early-season weed maps.

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