EFFECT OF POST EMERGENCE HERBICIDE ON THE REFLECTANCE RESPONSE PATTERNS OF CORN. Wesley J. Everman, Thomas T. Bauman, and Case R. Medlin, Graduate Research Assistant, Professor of Weed Science, Department of Botany and Plant Pathology, Purdue University, West Lafayette, IN 47907-1155; Assistant Professor of Weed Science, Department of Plant and Soil Sciences, Oklahoma State University, Stillwater, OK 74078-6028

To increase the ease of research being conducted in site-specific weed management and weed species identification via remote sensing, the impacts of herbicides on corn reflectance response patterns are being researched. It may be possible to find reflectance response patterns of individual weed species that would open the future to a broad expanse of possibilities in these fields. The identification of herbicides that do not impact the spectral response pattern of corn could be used for weed control over a large experiment area, with weeds of interest being established in untreated areas. This would reduce hand-weeding costs required to study reflectance response patterns of weed/crop population dynamics.

Experiments were conducted at the Agronomy Research Center near West Lafayette, IN. POST corn herbicide treatments evaluated were 1.7 kg a.i./ha atrazine + .95 L/ha COC, 560 g a.i./ha bromoxynil + 1% v/v COC, 798 g a.i./ha. 2,4-D, 212 g a.i./ha dicamba + 83 g a.i./ha diflufenzopyr + 0.25% v/v NIS, 70 g a.i./ha nicosulfuron + 1% v/v COC, and 40 g a.i./ha primisulfuron-methyl + 0.25% v/v NIS. The herbicides were selected to represent the chemicals used in the Midwest. Treatments were also selected to have varying modes of action that can result in various symptoms on the corn plants. This range of symptomology has the potential to create a broad range of plant reflectance response patterns.

Multispectral aerial images composed of three bands of reflectance were collected over the test areas from 3 to 8 weeks after herbicide application, with ranges: band 1: 80 nm, band 2: 70 nm, and band 3: 30 nm. Ground-based reflectance data were also collected with a GER 2600 field spectrometer mounted 7m above the crop canopy 2 weeks after application. Five readings per plot were collected near solar noon with <5% cloud cover. The GER 2600 collected measurements from over 500 bands of reflectance between 355 and 2600 nm.

SAS PROC STEPDISC and PROC DISCRIM were used to identify and model up to twelve bands of reflectance from the data most useful for differentiating between individual herbicide treatments and untreated plots and the Fisher linear discriminant classifier in MultiSpec was used to classify treated plots in pair-wise comparisons with the untreated plots. Results show POST herbicide treatments atrazine and primisulfuron-methyl have little or no impact on the spectral reflectance of corn and would be well suited for research areas that require no spectral change after application. 2,4-D and dicamba + diflufenzopyr were found to have an effect on the spectral properties of corn when using both multispectral and hyperspectral data. In situations where spectral reflectance change is not desired, neither 2,4-D nor dicamba + diflufenzopyr should be used. These herbicides have high potential to change the spectral reflectance properties of corn. Through further characterization of wavelengths to distinguish 2,4-D and improved classification procedures, areas treated with 2,4-D could be identified and potentially be used for research, commercial applications, or insurance purposes.