

USING HYPERSPECTRAL IMAGERY FOR DETECTION OF HERBICIDE INJURY IN SOYBEANS. David J. Alderks, Christy L. Sprague, Donald G. Bullock and Loyd M. Wax. Graduate Research Assistant, Assistant Professor and Professor, Department of Crop Science, USDA-ARS, University of Illinois, Urbana, IL 61801.

Herbicide injury on soybeans from spray drift, misapplication, or tank contamination of corn herbicides can be a major problem. There is very little information available on what effect mesotrione, a recently registered corn herbicide, has on soybean if exposure occurs and if this injury can be detected through the use of remote sensing. In 2001 and 2002, research was conducted examining soybean responses from simulated mesotrione drift and if this information could be correlated to hyperspectral imagery taken of the plots. Mesotrione rates ranged from the full labeled use rate of 105 g/ha down to 1/256X of the full labeled rate. In 2002, additional treatments included the addition of atrazine at 280 g/ha for the 1X rate. Atrazine rates decreased incrementally with the mesotrione rates. Soybean injury was examined 7, 14 and 28 days after treatment (DAT). Hyperspectral images were also taken at these times. A multivariate analysis was performed with the imagery data. The principal component analysis indicated that principal component one explained greater than 90% of the variability. Principal components and a calculated normalized difference vegetation index (NDVI) were correlated with visual injury and soybean yield. Significant soybean injury was observed starting at the 1/32X rate and 1/16X rate of mesotrione in 2001 and 2002, respectively. Significant yield reductions started at the 1/4X rate in both years. Correlations of the hyperspectral imagery with soybean injury and yield were 0.97 and -0.61 in 2001 and 0.92 and -0.87 in 2002, respectively. NDVI calculations indicated that not all hyperspectral bands were needed for injury detection.