SPECTRAL CLASSIFICATION AND IDENTIFICATION OF WEED AND CROP SPECIES

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Abstract

Experiments were conducted in 2000 at the Plant Science Research Center, Starkville, MS, to evaluate the use of spectral data in classifying different crop and weed species. The experiment was designed as a randomized complete block with 4 replications. Velvetleaf (*Abutilon theophrasti)*, redroot pigweed (*Amaranthus retroflexus*), johnsongrass (*Sorghum halepense*), broadleaf signalgrass (*Brachiaria platyphylla*), cotton (*Gossypium hirsutum*), and corn (*Zea mays*) were planted in 12 ft^2 plots. Each species was maintained free of other species and hyperspectral data were taken with a handheld spectroradiometer on two week intervals. Although spectral data were taken from 350-2500 nanometers (nm) discrete bandwidths were selected to correspond with available airborne sensors. The discrete bands selected were: Green 545-555 nm; Red 670-680 nm; and Near Infrared 835-845 nm. The following commonly used vegetation indices were computed using the selected bands: Normalized difference vegetation index (NDVI); Green normalized difference vegetation index (NDVIg); Global Environmental Monitoring Index; Near Infrared (NIR); Red vegetation Index (RVI); and Difference vegetation index (DVI). The computed indices and band widths were evaluated with PROC DISCRIM in SAS. This is a linear discriminant analysis technique where the dependent variable is categorized. Both the cross-validation (leave one out testing) and resubstitution options were used for analysis. As one would expect the resubstitution option resulted in greater overall classification than cross-validation. The cross-validation technique resulted in 91, 63, 63, 100, 46, and 33% correct classification of velvetleaf, redroot pigweed, broadleaf signalgrass, cotton, johnsongrass, and corn, respectively. Generally, broadleaf species are more easily differentiated from each other than grass species. These preliminary data indicate that spectral data holds promising potential in discriminating among species.

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 2:1230-1230 (2001)
National Cotton Council, Memphis TN