USING SPECTRAL VEGETATION INDICES FOR WEED DETECTION IN MINT**.** Mary S. Gumz and Stephen C. Weller, Graduate Research Assistant and Professor, Department of Horticulture and Landscape Architecture, Purdue University, West Lafayette, IN.

Peppermint and spearmint are grown as high value essential oil crops in the Midwestern U.S. (IN, MI, and WI) and the Pacific Northwest (OR, WA, MT, and ID). U.S. mint production must become more cost effective in order to compete with foreign produced mint oils and synthetic flavorings. Remote sensing-based site-specific weed management offers great potential to decrease weed control expense, the number one input cost in mint production, by simplifying weed detection and producing site specific weed maps for precision herbicide application. Our research objective was to develop a method of spectrally differentiating mint and weeds in remotely sensed images. Although supervised classification and discriminant analysis of hyperspectral reflectance data (296 to 1094 nm) can identify mint and weeds with >90% accuracy, these methods require extensive ground referencing or more expensive hyperspectral imagery. Spectral vegetation indices (SVIs) can be used to identify mint and weeds based on ratios of reflectance at two to three wavelengths. In our approach, reflectance levels were measured from experimental field plots of peppermint, native spearmint, giant foxtail, white cockle, tall waterhemp, Powell amaranth, common lambsquarter, and velvetleaf. Discriminant analysis identified potential wavelengths for use in developing spectral vegetation indices (SVIs) for discriminating between weeds and mint. SVIs based on simple ratios and normalized differences of reflectance values in the near infrared and green portions of the spectra accurately differentiated between peppermint, spearmint, and weed species. In addition, white cockle, Powell amaranth, common lambsquarter, and velvetleaf could be differentiated from each other. The development of these SVIs and the identification of specific wavelengths for weed identification in crops, as a result of this research, will allow calibration of multispectral sensors to wavelengths most useful for weed identification in developing site specific weed management programs for mint.

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