

GIS AS A TOOL FOR WEED MANAGEMENT IN INDIANA MINT. Mary S. Gumz and Stephen C. Weller, Graduate Research Assistant and Professor, Purdue University, Department of Horticulture and Landscape Architecture, West Lafayette, IN 47907.

Peppermint (*Mentha piperita*) and the spearmints (*M. spicata* and *M. cardiaca*) (“mint”) are grown in northern Indiana as essential oil crops and are Indiana’s largest acreage horticultural crop. Mint is considered an “at-risk” crop due to pressure from foreign production and synthetic flavorings and regulatory loss of key herbicides. Due to the limited number of herbicides available, a whole systems approach to weed control is necessary. In addition to effective use of herbicides, mint must be optimally managed in order to produce a strong healthy stand that can outcompete weeds. A GIS -based research approach to mint production was begun in Northern Indiana in 2002 and is ongoing. The goal of this project is to improve mint production efficiency through site-specific techniques with an initial emphasis on weeds and their management. Mint fields were selected to represent a wide range of soil types and within-field variability, including mint stand, weed infestation, and disease. Three-band multispectral aerial images were taken of mint fields at two to three week intervals during both seasons. Field conditions, including mint stand health and weed infestations, were ground referenced using DGPS receivers. Analysis of these images to find predictive spectral responses for various weed infestations and crop conditions is using MultiSpec©. Classification of mint crop vigor and areas of weed infestation, have been achieved with greater than 90% overall accuracy. Classification of some individual weed species, such as Canada thistle has also been achieved. Results indicate that mint’s competitive ability with weeds is determined by mint stand vigor which is influenced significantly by soil type and field moisture status. The health of the mint stand influences the distribution of and type of weed species present. In fields of healthy, vigorous peppermint, weed distribution is patchy and weeds are most prevalent in areas where there is no mint present. In low vigor mint fields, weed infestations occur throughout the field. These results indicate that a systems based approach using GIS technology has potential for use in achieving optimum weed control and production efficiency in mint.