HALLOIN, JOHN M.,[1,2]* and SUBASHINI NAGENDRAN[2]. [1]USDA, ARS, SBRU, East Lansing, MI 48824 and [2]Department of Botany and Plant Pathology, Michigan State University, East Lansing, MI 48824. **Differential susceptibilities to Cercospora leaf spot between green and white sectors of chimeral sugarbeet leaves.**

ABSTRACT

Resistance within sugarbeet leaves to infection by the leaf spot pathogen *Cercospora beticola* is induced by externally applied chemicals such as isonicotinic acid. Recent research on such resistance induction in plants of *Arabodopsis thaliana* has demonstrated greater persistence of the signal for resistance induction within albino tissues than in green ones. Chitinases are representative members of a group of proteins designated as pathogenesis-related proteins that are produced within leaves during the induced resistance response.

Typically, the youngest leaves of *Cercospora*-infected sugarbeet plants contain no disease lesions, whereas older leaves contain numerous lesions; this difference may be due to less susceptibility of younger tissues, as well as to less exposure of young tissues to inoculum. Occasionally, sugarbeet plants exhibit chimeras, in which both green and albino tissues occur on individual leaves. We reasoned that, in parallel with observations on *A. thaliana*, such leaves, on previously-infected plants might exhibit greater resistance of albino tissues than of green tissues to *C. beticola*.

We examined the relative abundance of *C. beticola* lesions on naturally infected, green and white chimeral tissues of sugarbeet leaves to determine if they differed in their susceptibilities to the pathogen, and evaluated chitinase production within these tissues to estimate host response to infection. Samples comprised of 10, 5mm diameter leaf disks were collected from lesions, interlesion areas, and healthy leaves. These samples were freeze-dried for storage, and subsequently were ground and extracted with pH 6 phosphate buffer, and "native" proteins in the extract were separated by electrophoresis on glycochitin-containing polyacrylamide gels at pH 8.9. Chitinase activity was detected by enzymic digestion of glycochitin in the gels at pH 5.0. Residual glycochitin in gels was stained with fluorescent brightener dye at pH 8.9 and observed under UV light

Contrary to our expectations, the youngest infected chimeral leaves contained lesions only on albino sectors. Slightly older leaves contained lesions on both green and albino sectors, but lesions were more abundant on albino sectors. Albino sectors thus were judged more susceptible to leaf spot than green sectors. Evaluation of chitinase activity from diseased and healthy tissues revealed similar enzyme activity upon electrophoresis of proteins from either tissue. No differences in enzymes were seen between green and albino tissues. The band from diseased tissue showed greater enzyme activity and greater electrophoretic mobility, however, evidence for new or increased enzyme synthesis in these tissues and for induction of resistance to *C. beticola* by prior infection seems equivocal.

Green and white chimeric sugarbeet leaves may provide a useful system for demonstration of differential gene expression in association with resistance to leaf spot disease. A major problem in predicting epidemics of Cercospora leaf spot of sugarbeets and in scheduling protective spraying is a lag of 7 to 10 days between initial infection and appearance of disease lesions. The greater observed susceptibility of albino tissues than of green tissues of chimeric plants may result in earlier appearance of disease lesions on the chimeric plants than on other sugarbeet plants. Such an event would allow more reliable scheduling of protective sprays. Observations will be made in 2001 of the dates of appearance of *Cercospora* lesions on chimeric and normal plants to determine if such alteration of predictive methods is feasible.