

OARDC Research Enhancement Competitive Grants Program

 SEEDS
Number 2



Development of Molecular Marker Systems to Improve Management of Resistance to Bacterial Spot of Tomato

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Plant diseases are responsible for causing millions of dollars in crop losses each year in Ohio. Resistant plant varieties provide an environmentally safe and effective means of controlling plant diseases. To effectively use resistant varieties we need to identify and characterize disease-resistance genes, and understand the extent to which these genes are capable of controlling disease over large areas. Technology based on the analysis of DNA, similar to that used in forensics, can be used to achieve these goals.

Using DNA analysis, we identified a gene that confers resistance in tomato to bacterial spot and located this gene on a genetic map relative to DNA landmarks called molecular markers. Because these landmarks can be detected using a small amount of DNA from seedlings, selection for resistance can be combined with techniques that speed flowering and fruit ripening under controlled conditions in the greenhouse. This approach makes it possible to grow up to three generations of plants in a year, while traditional approaches accomplish only one. We have also used molecular markers for the bacterial spot pathogen to quickly screen large field populations for resistance from Midwestern tomato fields.

OBJECTIVES

- ▶ Characterize resistance to a type of bacterial spot (Race T1) in a cross of two tomato varieties and to identify molecular markers linked to genes that are associated with resistance.
- ▶ Develop molecular markers and assays for rapid identification of the organism causing bacterial spot in the Midwest.

CHALLENGE

To develop environmentally safe control strategies for a bacterial disease of tomato.

ACHIEVEMENTS

We have mapped genes that are associated with resistance of bacterial spot and have developed resistant tomato lines that are now in field tests.

THE FUTURE

There is still much progress to be made if we are to control all the different forms of bacterial spot. Additional grants and contracts from industry partners in the amount of \$71,000 have been obtained. These additional funds will continue our research beyond the preliminary work done in this study and will allow us to further develop resistant tomato lines.



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