New York State Integrated Pest Management Program

Technical Report for IPM Grant entitled:

Evaluating the Use of PCR (Polymerase Chain Reaction) to Detect Phytophthora infestans in Field-infected Potato and Tomato Tissue

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Results

The 1997 growing season was conducive for late blight (Phytophthora infestans) development on tomato and potato in New York State. Western and Central New York regions were hardest hit. Late blight on home garden tomatoes was epidemic in Erie County, New York.

A total of 56 field-infected potato and tomato samples were evaluated using PCR (Table 1). With PCR, small amounts of DNA specific to certain target organisms (Phytophthora infestans, in this case) are amplified to detectable levels. Samples were also evaluated for late blight by determining the presence or absence of P. infestans sporulation. This often required incubation of samples in moist chambers for several hours. Using the PCR technique, 39 samples were determined to be negative and 17 positive for late blight. In 19 cases there were disagreements between PCR results and sporulation results. In 16 of these, PCR results were negative while sporulation results were positive. In the other three cases, the PCR technique confirmed the presence of late blight while sporulation results did not.

There are two explanations for the failure of the PCR technique to detect late blight in samples determined to be positive via sporulation. Cellular components of foliar samples, especially tomato foliar samples, interfered with the extraction of P. infestans DNA, thus the detection of late blight. This is a valuable piece of information. Perhaps fungal DNA extraction techniques can be modified in the future to resolve this problem. There were also problems with the overall running of the PCR technique part of the season; during these time periods all samples run, including positive control samples, came out negative.

In four cases, late blight could be confirmed via PCR but not sporulation due to the badly decayed condition of the samples upon arrival. In three PCR-positive but sporulation-negative cases, sporulation confirmation was attempted but was unsuccessful; apparently other organisms present in these samples suppressed P. infestans sporulation. A key advantage of the PCR technique is the ability to detect P. infestans when other microorganisms are present.

For a printed copy of the entire report, please contact the NYS IPM office at:

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