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Building the "Rust Fast Track System" for Identifying Asian Soybean Rust in Iowa

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Abstract

Asian soybean rust is a serious soybean leaf disease not yet discovered in Iowa. There are common soybean leaf diseases that may be confused with Asian soybean rust. To achieve accurate and prompt identification of Asian soybean rust throughout the state, the Iowa Soybean Rust Fast Track system was created. This unique system makes use of hundreds of private agricultural professionals throughout Iowa and 40 Iowa State University Extension field personnel to filter out suspected soybean rust samples that are common soybean leaf diseases, thereby ensuring that the ISU Plant Disease clinic is not inundated with minor diseases of soybean.

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Introduction

Asian soybean rust (ASR) is a leaf disease of soybeans caused by the fungus *Phakopsora pachyrhizi*. The disease causes serious crop losses in Africa and South America. There are more than 10 million acres of soybean grown in Iowa, contributing almost \$3 billion annually to the state's economy. Consequently, ASR is a serious threat to the economy of the state.

In August 2003, the Iowa Soybean Rust Team was formed to prepare for the anticipated arrival of ASR in Iowa. At that time, the disease had not yet been found in the continental US. The Iowa Soybean Rust Team consists of personnel from Iowa State University (ISU), the Iowa Soybean Association (ISA), the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS), and the Iowa Department of Agriculture and Land Stewardship (IDALS).

According to US federal guidelines, the first discovery of ASR in any state can only be confirmed when:

1. A soybean sample suspected of being infected with *P. pachyrhizi* is submitted to the plant disease clinic at the land-grant university in the state.
2. The sample is logged into the National Plant Diagnostic Network system.
3. The sample is sent to a designated USDA laboratory in Beltsville, Maryland, for molecular confirmation of infection by *P. pachyrhizi*.

Successful management of ASR requires rapid identification and timely application of fungicides to prevent further infection. But fungicides are costly and should not be applied unnecessarily. There

are several foliar diseases of soybean that occur in Iowa that could be confused with ASR. So the Iowa Soybean Rust Team created the "Rust Fast Track System" to facilitate rapid identification and accurate communication when this disease arrives in the state.

The Rust Fast Track System is a unique, formal partnership between the Iowa Soybean Rust Team and hundreds of private agricultural professionals. Soybean samples suspected of being infected with ASR are evaluated by successive layers of individuals with increasing expertise and training on soybean leaf disease identification (Figure 1). A grower who thinks he or she may have an outbreak of ASR takes a sample of suspected infected soybean leaves to a First Detector. All First Detectors are trained on how to distinguish common soybean leaf diseases from ASR. First Detectors are agricultural professionals; many are certified crop advisors or certified professional agronomists. Most First Detectors work for grain elevators, cooperatives, and seed and chemical companies, but some are independent crop consultants.

Figure 1.
Sequence of Sample Submission in the Iowa Soybean Rust Fast Track System



If a First Detector cannot determine for certain that a soybean leaf suspected to be infected with ASR is not ASR, the sample is taken immediately to a member of the Triage team. The Triage team comprises ISU Extension field staff who have received advanced training about identification of common soybean leaf diseases and ASR.

If the Triage team member cannot determine for certain that the suspect sample is not ASR, the sample is taken immediately to the ISU Plant Disease Clinic for examination by two full-time plant diagnosticians. ISU Department of Plant Pathology personnel carry a beeper during non-business hours in case a Triage team member cannot deliver a suspected ASR sample to the Plant Disease Clinic during normal hours.

The Rust Fast Track System expedites evaluation of suspected ASR-infected soybean samples by reducing the number of samples that must be critically evaluated by the two full-time ISU Plant Disease Clinic personnel. First Detectors and Triage team members filter out suspected ASR samples that are actually other common soybean leaf diseases.

There is no charge for soybean samples that are sent through the Rust Fast Track System. However, this system will only determine presence or absence of ASR. For full diagnosis of diseases other than ASR, soybean samples must be submitted to the ISU Plant Disease Clinic through regular channels and the normal fee must be paid.

Building the Iowa Soybean Rust Fast Track Identification System

Between June 2004 and June 2005, more than 600 agricultural professionals were trained to be First Detectors, and more training sessions are planned. First Detectors attended two workshops as part of their training. In the spring of 2004, 40 ISU Extension field personnel were trained to be members of the Triage team. Training sessions were organized by ISU, and representatives from ISA and IDALS and faculty from the ISU Department of Plant Pathology conducted the training.

Training Objectives

The objectives of First Detector and Triage team workshops included to:

- Understand biology and epidemiology of *P. pachyrhizi*,
- Distinguish between ASR and other look-alike diseases,
- Understand regulatory issues pertaining to ASR, and
- Introduce the National Plant Diagnostic Network (NPDN).

Additional objectives for Triage team members included to:

- Understand crop insurance issues related to ASR and
- Learn about Iowa research on ASR and its management.

A list of First Detectors and Triage members can be found on the Iowa Soybean Rust Team Web site (<http://www.soybeanrust.info>). The names of First Detectors in a particular county are found easily by clicking on the county of interest in a map. County Extension offices help growers who do not have Internet access obtain this information.

Supporting the Iowa Soybean Rust Fast Track Identification System

To support the Iowa Soybean Rust Fast Track System, four separate publications were created, one each for the general public, Iowa soybean growers, First Detectors, and Triage team members (Anonymous, 2004; Robertson & Yang, 2004; Robertson, 2005; Robertson & Tylka, 2004b). Each publication provides user-applicable information on soybean rust and the Iowa Soybean Rust Fast Track System.

Conclusions

In November 2004, ASR was first discovered in the continental U.S. (Robertson & Tylka, 2004b), but ASR had not yet been found in Iowa as of May 2006. Only three soybean samples suspected of being infected with ASR were submitted to the ISU Plant Disease Clinic during the 2005 growing season, and none had the disease. We believe the small number of suspect ASR samples submitted to the ISU Plant Disease Clinic indicates that common soybean leaf disease samples are being diagnosed by First Detectors and Triage team members.

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