Two Leaf Rusts Found Where One Expected

Until recently, plant pathologists could identify only one species of rust fungus attacking the leaves of both wheat and rye plants.

Now, ARS scientists studying leaf rust resistance in wheat have determined there are two distinct species: *Puccinia recondita,* which infects rye, and *Puccinia triticina,* which infects wheat.

"There had long been disagreement about whether both rye and wheat are infected by the same rust species," says Kurt Leonard, a plant pathologist who leads research in the ARS Cereal Rust Research Unit at St. Paul, Minnesota. "We were surprised by how big the genetic differences were between the two fungi."

This distinction between the two types of rust is important. It means plant breeders must take the finding into account when crossing rye and wheat or transferring genes to wheat from rye or a wild wheat relative. This is because the crosses may result in a hybrid that is susceptible to infection by both leaf rust species.

Working with researchers at Tel Aviv University in Israel, ARS scientists found characteristics that distinguish between rye leaf rust and wheat leaf rust.

"They also tried crossing the rye and wheat leaf rust fungi and found they couldn't interbreed," says Bill Bushnell, who is a plant physiologist. "This is strong evidence the two are not the same species."

ARS is working with scientists in the Middle East because wheat and related cereals originated in that part of the world—and so did the leaf rusts that attack them.

Using sophisticated laboratory tests in cooperation with the scientists at Tel Aviv and the University of Minnesota, ARS scientists were able to measure the DNA content of the two rust species. It turns out the leaf rust that affects rye and several wild relatives of wheat has significantly larger amounts of DNA than the leaf rusts of bread wheat.

"Plant breeders have been crossing wheat with rye and wild relatives of both for decades in an effort to bring in new resistance genes to thwart leaf rust," says Leonard.

"Now we find that in Morocco, durum wheat, which is used primarily in pasta, is infected with a leaf rust similar to rye leaf rust, while in the rest of the world it is infected by the wheat leaf rust fungus. Future hybrids between wheat and rye should be tested for resistance to both types, to be safe."—By **Dawn Lyons-Johnson,** ARS.

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Genetic Test Pinpoints New Swine Diarrhea

In Iowa and Australia, pig producers have been talking about a new bacterium that causes watery diarrhea in pigs.

Although the diarrhea it produces doesn't cause bloody stools like swine dysentery does, it still weakens the pigs, slows their growth, and does a number on producers' potential profits.

Until now, this bacterium resembling *Serpulina hyodysenteriae*—the causative agent of swine dysentery—hasn't had a name. Agricultural Research Service microbiologists Neil S. Jensen and Thad B. Stanton changed that when they cracked its genetic code and developed a DNA-based test to identify it.

Naming bacteria isn't new to Jensen and Stanton. They changed the name of *Treponema hyodysenteriae* to *Serpulina hyodysenteriae* in 1994, to more accurately describe that serpent-shaped bacterium.

More recently, the use of electronic mail opened up a global laboratory for Jensen and Stanton. No longer confined to their lab module at ARS' National Animal Disease Center (NADC) in Ames, Iowa, the two researchers connected with Australian collaborators from Murdoch University in Perth.

That's how Australian graduate student Darren J. Trott came to work in Stanton's laboratory and to coin the name for the puzzling new bacterium: *Serpulina pilosicoli.* The name was reported in the January 1996 issue of the *International Journal of Systematic Bacteriology,* published by the American Society for Microbiology.

"It's exciting to name a bacterium," says Stanton. "Once something has a name, everyone wants to talk about it. *S. pilosicoli* has been identified in about half of the recent samples we've checked from diseased pigs with spirochetal diarrhea in Iowa, and there's a real need to determine the economic significance of this disease."

Jensen's DNA-based test distinguishes between *S. pilosicoli* and similar bacteria. It is being used at NADC to assist lab clinicians at Iowa State University's Veterinary Diagnostic Laboratory. Farmers and veterinarians send fecal samples to the ISU laboratory in hopes of identifying the cause of intestinal disease in their pigs.—By **Linda Cooke,** ARS.

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