

New And Old Threats To Soybean Production

URBANA, ILL.

University of Illinois researchers identified the top pathogens, pests and weeds affecting soybean production in a recent article in Food Security. Soybean aphid, soybean rust, soybean cyst nematode, Sclerotinia stem rot and the exotic pathogen, red leaf blotch, were featured as some of the top biotic constraints that may affect soybean production now and in the future.

"Enormous potential exists to increase future soybean production," said Glen Hartman, U of I professor of crop sciences and USDA-ARS research scientist. "Genetic resources, used through both traditional breeding and bioengineering, may provide the solutions needed to combat current and future disease problems."

As soybean production has increased over the past 50 years, so has the intensity of biotic constraints that ultimately threaten yield.

"Where soybean is grown every year or even every other year, pathogens often have increased in density to cause economic losses in yield," Hartman said. "Parasitic microorganisms, including bacteria, fungi, nematodes, Oomycetes, and viruses all contribute to economic damage. A similar story occurs for pests; many, such as aphids, beetles, mites, and stinkbugs, cause considerable economic damage to the soybean crop."

Although aphids, rust, nematode and Sclerotinia stem rot are commonly known and recognized by soybean growers, less information is known on red leaf blotch, an exotic disease caused by the fungal pathogen *Phoma glycicola*, he said.

"The fungus that causes red leaf blotch is listed on the USDA Agricultural Select Agent List – the same list as anthrax," Hartman said. "So far, this disease has only been reported in Africa. However, if red leaf blotch is found in the United States, a recovery plan through the USDA-APHIS program has been developed that outlines a course of action to prevent it from spreading."

Red leaf blotch symptoms include lesions on foliage, petioles, pods and stems. The fungus does not appear to be seedborne, but may be

transported along with soil and other debris in grain. Yield losses of up to 50 percent were documented in Zambia and Zimbabwe in the 1980s.

"We don't want to scare people because this disease has not been found in the United States," Hartman said. "But we do want growers to be aware of it because they are typically the ones to find new pathogens, pests and weeds in their fields. Our goal is to build awareness among crop specialists and producers so we can stay ahead of it."

Hartman said more research is needed to develop molecular diagnostic techniques to identify this pathogen from other common foliar soybean pathogens, to provide better information on fungicide chemistry and application timing, to develop varietal resistance and gather more data to develop predictive models for potential containment and management.

To successfully reduce losses due to pathogens and pests, a number of practices used alone or in combination may be needed; these include cultural and seed sanitation techniques, pesticide applications, and deployment of soybean cultivars with resistance.

"Biosecurity of food crops is important because we don't want to suffer food shortages – whether it's due to natural disasters or pathogens and pests that we can sometimes control," Hartman said. "If you are talking about food and crop improvement, you are always talking about reducing diseases and pests."

This article, "Crops that feed the World 2. Soybean – worldwide production, use, and constraints caused by pathogens and pests," appeared in Food Security. Researchers included Hartman, Ellen West and Theresa Herman of the U of I. Funding was provided by the Illinois Soybean Association, the North Central Soybean Research Program and the Elizabeth Hageman Endowed Graduate Research Fellowship.

Hartman will discuss these pathogens and pests in addition to their threat levels at the 2011 U of I Agronomy Day on Thursday, August 18. Δ