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FACT SHEET

WHEAT BLAST

WHEAT BLAST IS A RELATIVELY NEW DISEASE OF WHEAT CAUSED BY THE FUNGUS *MAGNAPORTHE ORYZAE* *Triticum* pathotype (MoT). It was first reported in Brazil in 1985 and has become locally important in the South American countries of Brazil, Bolivia, Paraguay since its emergence. In 2009, the dual epidemics of wheat blast and Fusarium head scab in Brazil have lowered that nation's wheat output by 30 percent. The South American (SA) strains of MoT are genetically diverse and react differently in various SA wheat varieties. In 2012, wheat blast was reported on a single wheat plant in a research plot in Kentucky. Comparative genomic analysis of the Kentucky strain with an SA strain indicated that they emerged from different *M. oryzae* populations. The Kentucky strain most likely emerged in Kentucky from the gray leaf spot pathogen of annual ryegrass and was not introduced from SA. The SA strain appears to have emerged from wild grass populations of *M. oryzae* in SA. More recently, in 2016, wheat blast emerged in Bangladesh and caused a severe epidemic.

SIGNIFICANCE

Considering the importance of wheat to current global food security, its projected importance to feeding an additional two billion people by 2043, wheat blast has the potential to put increased pressure on food security in developing countries and to disrupt the economic well-being of several developed nations.

IMPACTS

MoT infects all above ground plant parts and causes leaf lesions and head blight. Seed in infected heads are smaller and of low quality. In severely diseased wheat heads, seed may be absent. Locally severe epidemics with up to 90-100 percent loss in affected fields, lowered productivity, and poor seed quality are common in epidemic years. To date, minimal trade impacts have been reported. However, this could change as the profile of wheat blast increases and if the pathogen spreads to more countries within SA or Southeast Asia.

PROGNOSIS

Based on a quantitative pathway analysis (Cruz, et al., manuscript in preparation), the probability exists for the spread of the wheat blast pathogen to additional countries as a consequence of trading wheat grain or by exchanging wheat breeding germplasm. As a result of a program in Brazil that promotes and integrates domestic market systems and export markets, it is possible that the pathogen has already been distributed to other countries following the 2009 epidemic. The Bangladeshi isolate from the 2016 epidemic is related to South American isolates, but the precise county of origin cannot be definitively determined.

The potential for the emergence of *M. oryzae* strains that are highly virulent and aggressive to wheat from *Lolium* populations of *M. oryzae* indigenous in the United States is unknown and needs investigation.

IMPORTANT FACTS

1. Wheat blast has been increasing in importance and area impacted since 1985, with recent epidemics in 2009 and 2012 in Brazil, 2014 in Bolivia, and 2016 in Bangladesh. The threat to U.S. wheat production is currently under evaluation.

2. We have many knowledge gaps about wheat blast disease ecology, epidemiology, and the

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Blasted Wheat Heads – Brazil 2012

Wheat Blast Epidemic – Brazil 2012

biology of the MoT pathogen. Ongoing NIFA-funded Agriculture and Food Research Initiative research and extension is addressing some of the questions, but additional research will be required to understand and effectively manage this emerging disease.

3. While the native fungus causing gray leaf spot on turf grasses (*M. oryzae Lolium – MoL)* might pose an immediate threat to U.S. wheat, native strains causing the serious blast disease on rice in the U.S. (*M. oryzae Oryzae - MoO*) are distinct and do not pose a serious threat to wheat.

4. The pathosystems of the fungus that occur on various hosts (*M. oryzae* pathosystems - i.e., MoT-wheat, *MoO*-rice, *MoL*- ryegrass) may be similar in pathogen biology, epidemiology, and disease management, but we cannot assume that what we know about the other pathosystems has any relationship to the wheat disease.

5. The MoT pathogen varies substantially in how it expresses disease in commercial wheat varieties in South America. Yet there is not very much resistance in currently available wheat varieties. Consequently, concerted wheat breeding efforts are necessary for South America and in preparation should the disease reach the United States.

6. Leaf infection may or may not be important in the infection of wheat heads. We do not fully understand the most important sources of the pathogen for head infection.

Shriveled seed associated with head infections.

Leaf infections by the blast pathogen.

Photos by KSU Communications and Marketing

Early detection of the disease is imperative.

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