

"WORLD FOOD SECURITY AT RISK?"

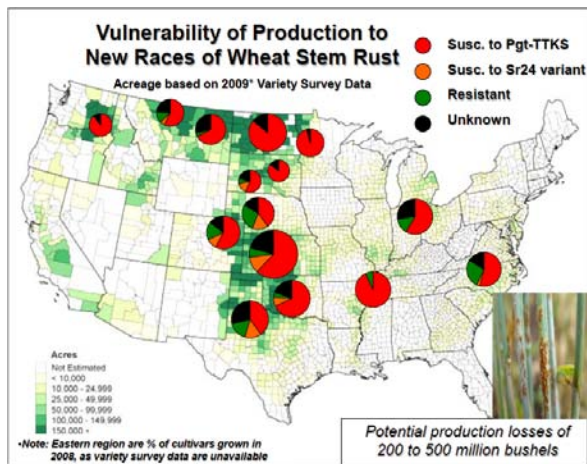
The Race Against Ug99 Stem Rust in Wheat

US Wheat Production and World Food Security are at Risk to Highly Virulent Cereal Rust Diseases, Including Ug99 Stem Rust

\$9 billion of US Wheat Production at Immediate Risk to Ug99:

Highly virulent and aggressive new races of stem, leaf, and stripe rust have appeared in the world, which threaten the entire US production of wheat, barley, and oats. Nearly all US spring wheat varieties are susceptible to the new African stem rust race 'Ug99', placing 16 million acres of production at risk. Over 75% of US winter wheat acreage, nearly 23 million acres, is now highly vulnerable. Ug99 was confirmed in Iran in 2007 and is poised to move into the agricultural areas of Pakistan, India, and Afghanistan, where over 75% of the wheat grown is considered highly susceptible. It is only a matter of time before Ug99 reaches the US.

Stem rust is not a new threat to wheat. Epidemics between 1917 and 1962 caused production losses of 20% to nearly 50% in the northern plains states. Today, a similar epidemic of Ug99 would mean losses of 200 to 500 million bushels of production, worth \$1 to \$2.5 billion to producers.



'Rust never sleeps' – Beyond Ug99:

Leaf rust and stripe rust cause serious losses in US wheat production nearly every year. From

2000 to 2004, US losses to leaf rust were estimated at over 100 million bushels, worth over \$350M. New virulent races of stripe rust have appeared since 2002, causing dramatic production losses throughout the US; estimated at \$360M in 2004 alone.

Rust pathogens evolve rapidly and have overcome many important genes for resistance. Complacency of the past decades is no longer an option. Recent spikes in food prices remind us that food security is increasingly tenuous for many countries.

Action is being taken, but time is short, funding insufficient:

An aggressive, coordinated research effort is underway to identify and introduce new germplasm, genes, and varieties with improved and sustainable rust resistance. We are thankful to Congress for appropriating \$1.5 million in Fiscal years 2009 and 2010 for Ug99 research. USDA-ARS is taking a leadership role in this effort, but additional funds and scientific resources of the entire US small grain research community must be mobilized to prevent devastating losses in grain production. The USDA Ug99 Action Plan is not yet fully funded.

US and World Wheat Production are Highly Vulnerable to Ug99 and Variants of Ug99

- Nearly 16 million acres and 600 million bushel of production, worth \$2.8 billion per year, are at risk in the US spring wheat region (MN, SD, ND, MT).
- Over 20 million acres and 800 million bushel of production, worth nearly \$4 billion per year, are at risk in the US hard winter wheat region (TX, OK, CO, KS, NE, and SD)
- Approximately 75% of the 8.4 million acres of eastern US soft red winter wheat (GA, NC, KY, VA, OH, IN, MO, MI, NY, and AR) are at risk, annual production valued at over \$1.7 billion.
- Over 75% of wheat acreage in India, Pakistan, and Afghanistan, representing 20% of world production, is planted to susceptible varieties; areas that already suffer from significant food and political insecurities.

The Rust Threat is Growing, Moving

- Rusts are wind-blown diseases. Since 1999, Ug99 stem rust has moved throughout East Africa to Yemen and, in 2007, was found in Iran.
- The Sr24 variant of Ug99 is now dominant race in Kenya, which dramatically increases US vulnerability.

Resources, Commitment are Needed

- Variety development timelines, usually 10-12 years, must be reduced using all available tools, including molecular markers, doubled haploid technologies, enhanced field and lab screening, winter nurseries, and rapid seed increase.
- Major genes for resistance, most easily used, are most easily defeated by rusts. Increased investments in gene and marker discovery are needed to identify and manipulate more durable quantitative and adult-plant resistance genes.
- Additional germplasm enhancement is critical if genes from exotic or weedy relatives are to be useful and deployed in commercial varieties.

Wheat is fundamental to US agriculture and food security

Additional Information:

<http://www.wheatworld.org/issues/research>

<http://www.ars.usda.gov/ug99/>