

# Cereal Rust (Ug99) Disease Initiative

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

The wheat industry thanks Congress for \$1.5 million in FY09 and \$1.58 million in FY10 for USDA-ARS Wheat Rust Research. This was a critical first-step to rebuild ARS research capacity to address US vulnerability to Ug99 stem rust. However, additional research funds are needed to rapidly develop and deploy local varieties with resistance to increasingly virulent rust diseases. We encourage Congress to provide an additional \$2.5M for Cereal Rust Research to USDA-ARS in FY11. This funding is needed to implement the second half of the Ug99 action plan for collaborative ARS-state research to deploy new genes and varieties.

### **\$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.

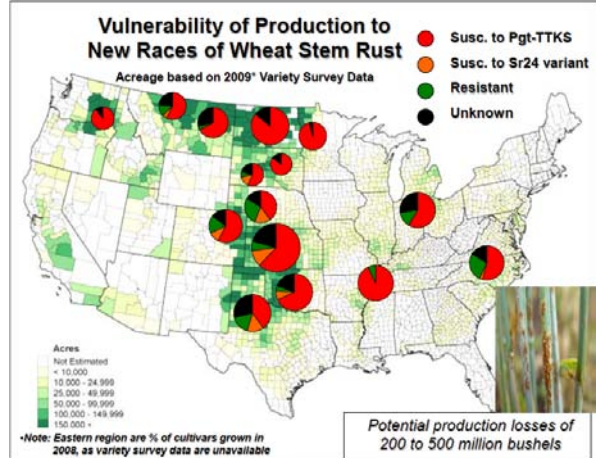
### **'Rust never sleeps' – Beyond Ug99:**

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. 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.



## **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 funding for germplasm enhancement is critical if genes from exotic or weedy relatives are to be useful and deployed in commercial varieties.

## APPROPRIATIONS REQUEST FOR FY 2011

Cereal Rust Disease Initiative	\$2,500,000
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# Cereal Rust (Ug99) Disease Initiative

Appropriations Bill	Agriculture
Agency	US Department of Agriculture
Account	Agricultural Research Service
Program Name	Salaries and Expenses



**Requested amount:** **\$2,500,000**

## Authorization

- Department of Agriculture Organic Act of 1862

## Description

- Funding through USDAS-ARS is needed for an aggressive, coordinated research effort to combat cereal rust diseases, including the virulent African stem rust race Ug99, to identify and introduce new germplasm, genes, and varieties with improved and durable resistance to cereal rust diseases. The FY11 funding request is to implement the second half of the Ug99 action plan for collaborative ARS-state research needed to develop and deploy new resistance genes in locally-adapted varieties.

## Justification

- Highly virulent and aggressive new races of stem, leaf, and stripe rust have appeared in the world, which now threaten the entire US production of wheat, barley, and oats. The African stem rust race Ug99 has defeated nearly all major genes for resistance currently deployed in the US and around the world.
- Wheat varieties growing on nearly 40 million acres in the US are currently susceptible to Ug99 stem rust, placing annual production of over 2 billion bushels, worth \$9 billion, at great risk. New races of leaf and stripe rust diseases have caused production losses worth over \$750 million since 2000.
- Cereal rust diseases directly impacts wheat growers, grain handlers, exporters, the US milling and baking industry, and consumers through lower crop yields, reduced grain supplies, poorer grain quality, and higher commodity prices.
- Funds are needed to identify and develop new, more stable sources of genetic resistance and to rapidly develop and deploy improved varieties throughout the US. Priority investments include support for breeding, gene discovery, molecular markers, germplasm enhancement, disease screening, race characterization and disease monitoring.
- USDA-ARS must take a leadership role in this effort, but funding and collaborative scientific resources of regional wheat programs must be mobilized to prevent devastating losses in grain production. USDA-NIFA Competitive grants, focused on short-term basic research, are not a viable option for funding critically important, long-term applied research.
- Four USDA-ARS Regional Small Grains Molecular Genotyping Laboratories (NC, ND, KS, and WA) are a valuable resource to identify genes, markers, and deploy improved resistance to rust diseases. Funds are needed to meet the rapidly growing demand for marker information. The Pullman, WA, facility is critically underfunded and needs \$400,000 to bring the laboratory to full operational capacity.

## Funding History

FY 2011 (President's Budget)	FY2010	FY 2009	FY 2008	FY2007	FY2006
Unknown	\$1,580,000	\$1,500,000	0	0	0

**Additional Information:** [www.wheatworld.org/issues/research](http://www.wheatworld.org/issues/research)