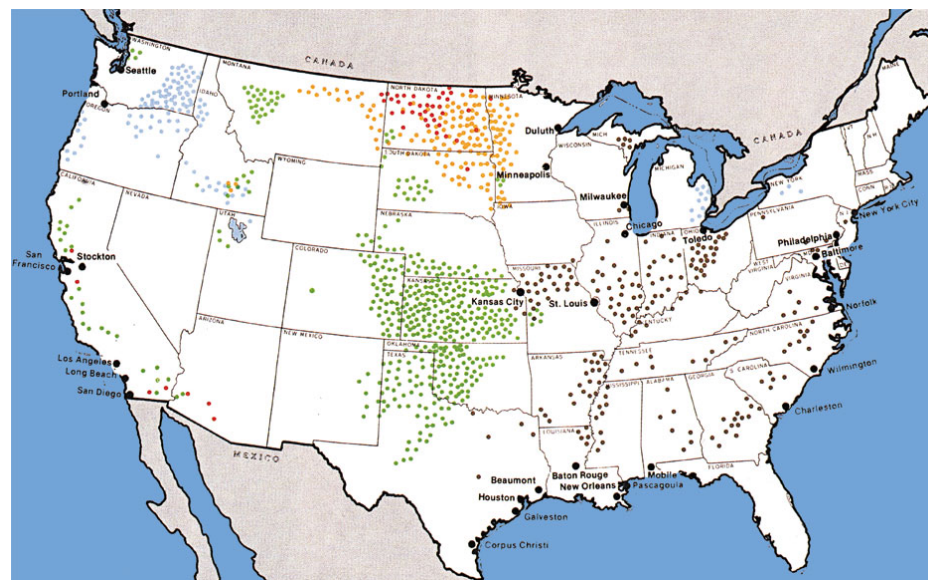


# U.S. Wheat and Barley is at Risk to Ug99

- Most virulent cereal rust mutant in 60 years
- U.S. wheat varieties are more than 80% at risk as are almost all barley varieties
- More than 95% of new spring wheat varieties are at risk



Kay Simmons

Office of National Programs

USDA-ARS

# ***Action Plan to Minimize Impact of Ug99 Stem Rust in the U.S. : [www.ars.usda.gov/ug99/](http://www.ars.usda.gov/ug99/)***

## ***Components***

- Cereal Stem Rust Assessment and Pathology
- Detection and Identification
- Monitoring and Reporting
- Germplasm Enhancement, Gene Discovery, Development of Molecular Markers
- Regional Variety Development, Evaluation and Implementation
- Disease Management
- Communication and Outreach

**USDA agencies: APHIS, ARS, NIFA, OPMP**

**National Wheat and Barley Improvement Committees**

**American Phytopathological Society, National Plant Board**

# Assessing Ug99 vulnerability of the world's wheat

## USDA Responds:

- Germplasm screening and identifying sources of genetic resistance in Eastern Africa

Yue Jin, St. Paul, and David Marshall, Raleigh, at (KARI)  
Kenya Agriculture Research Institute





# Assessing U.S. vulnerability Deploying genetic resources

All U.S. wheat and barley breeders invited to submit breeding lines for African screening

U.S. NPGS small grains collection shared

Developing methods to mimic Ug99 screening



Blair Goates, Harold Bockelman, Mike Bonman, Eric Jackson, National Small Grains Repository, Idaho

# **Participants in Stem Rust Nursery – Njoro, Kenya 2005-2009**

**28 Universities (Arkansas, California, Clemson, Colorado, Cornell, Florida, Georgia, Idaho, Illinois, Kansas, Kentucky, Louisiana, Maryland, Michigan, Montana, Nebraska, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Purdue, South Dakota, Tennessee, Texas, Utah, Virginia, and Washington)**

**11 Companies (AgriPro/Syngenta, BARI, Genesis, Great Lakes, Kolding, Sunbeam, Pioneer, Plant Breeders, Resource Seeds, Trio, and WestBred)**

**8 ARS Locations (Aberdeen, Ames, Lincoln, Manhattan, Pullman, Raleigh, St. Paul, and Stillwater)**

# USDA-ARS Cereal Disease Laboratory, St. Paul, MN

## Seedling tests to identify rust biotypes and wheat/barley resistance genes

Yue Jin, CDL









# Sr24 Virulence

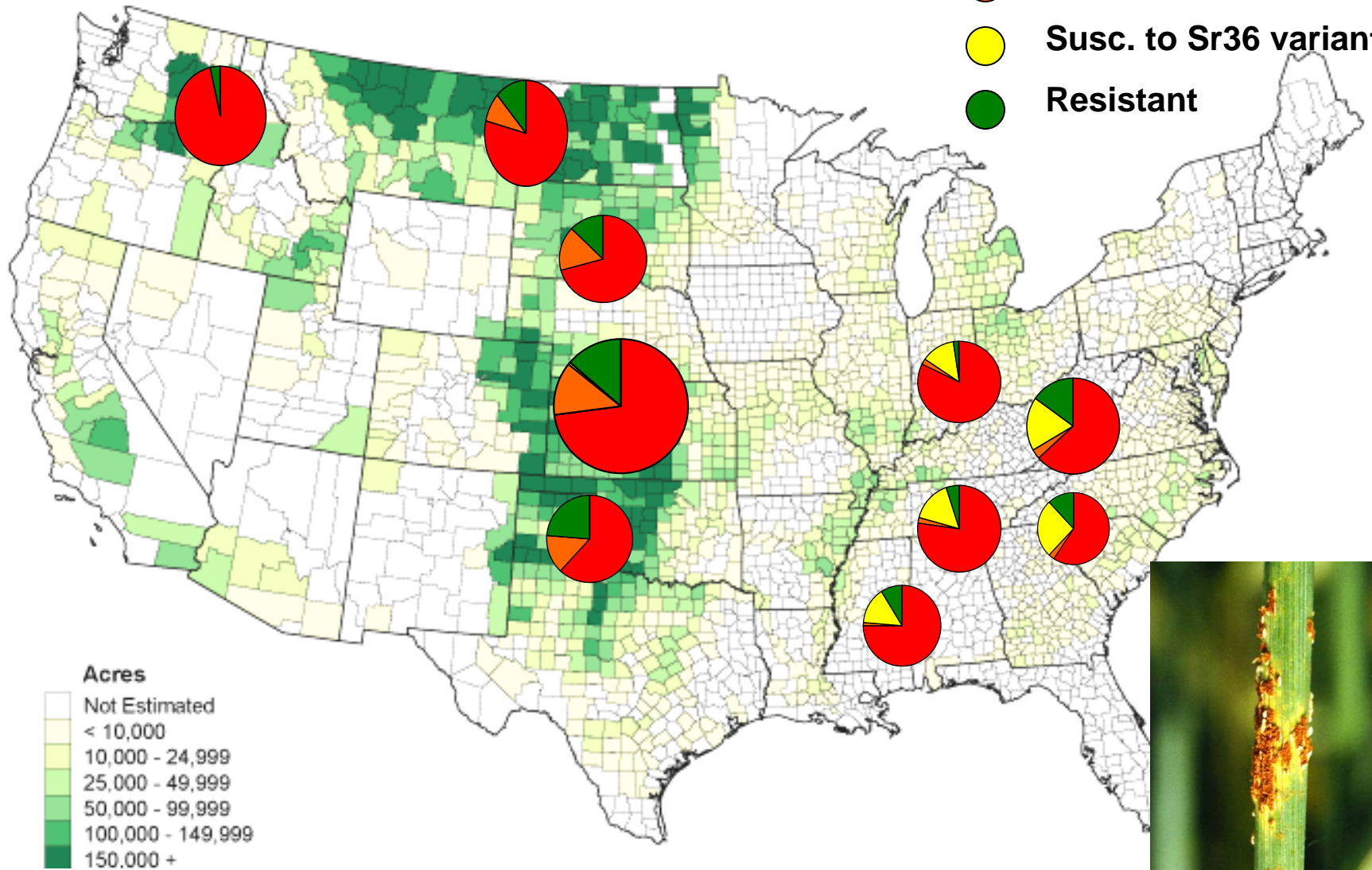
- **Sr24 was highly effective against Ug99, a major component for Ug99 resistance in US wheat**



**In 2006, scattered MS to S pustules with low frequency were seen in many Sr24 lines in the Kenyan stem rust nursery. Sr24 virulence was suspected.**

# Reaction of Wheat Germplasm in 2007-08 USDA-ARS Regional Nurseries to Stem Rust

-  Susc. to Pgt-TTKS
-  Susc. to Sr24 variant
-  Susc. to Sr36 variant
-  Resistant





## ***Breeding objectives***

***Identify and develop stem rust resistant cereal germplasm from:***

- ***wheat and barley gene pools***
- ***land races***
- ***wild relatives***

***Reduce linkage drag associated with introgressing rust resistance genes***

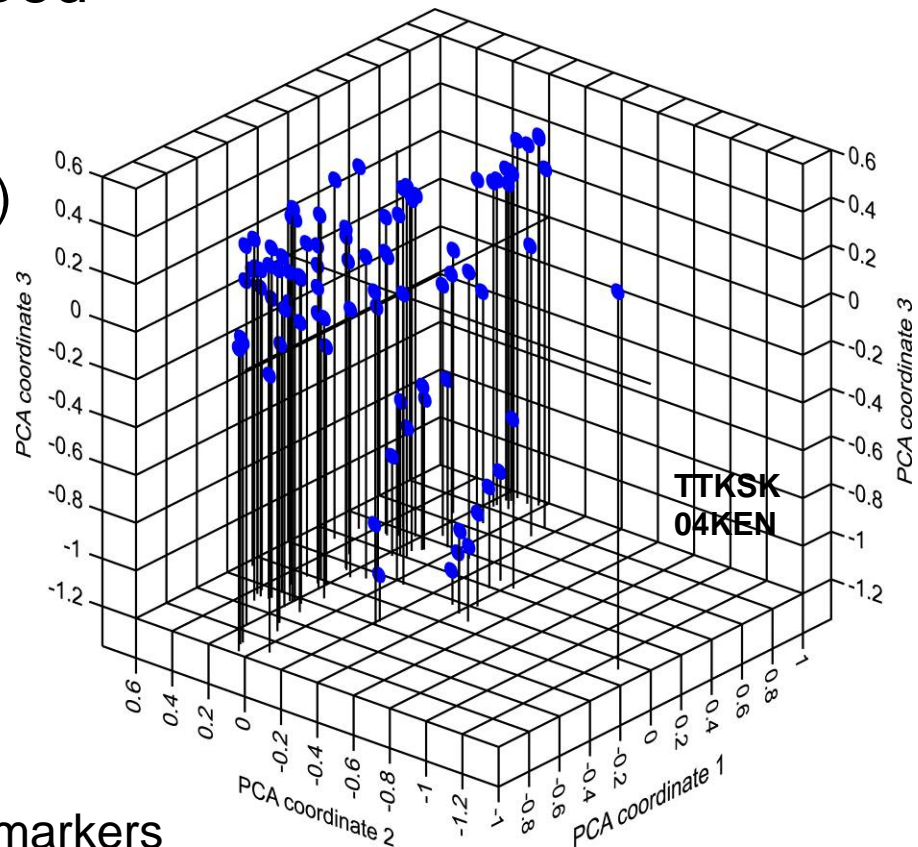
***Breeding resistant varieties***

# Detecting Ug99

- Field tests – differential varieties/trap plots growing wheat varieties with differential responses to rust races
- DNA - SSR marker set developed
  - Ug99 race cluster is distinct from all N. American isolates tested (54) and limited worldwide collection (36)

**Les Szabo, Cereal Disease Lab,  
St. Paul, MN**

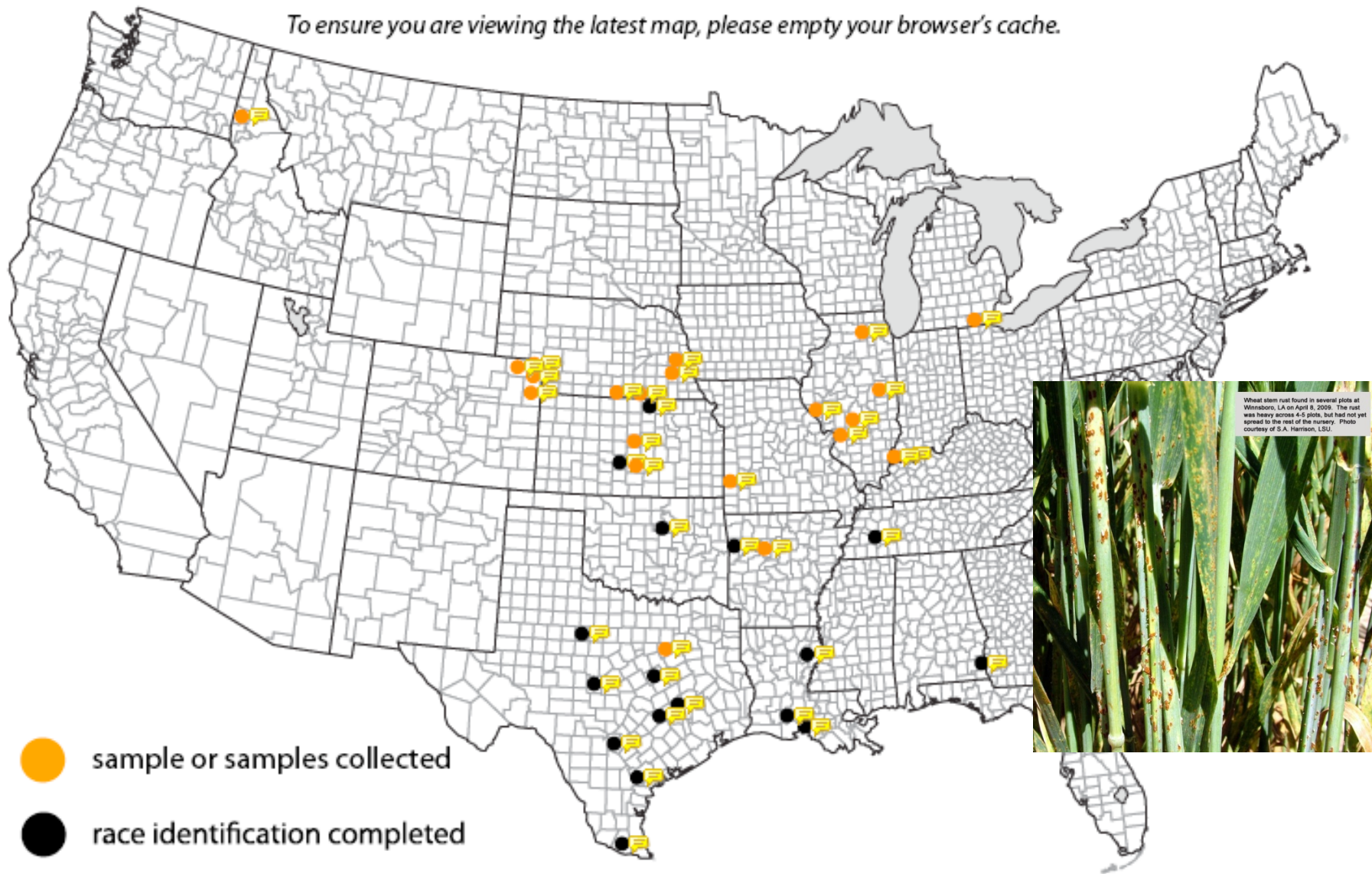
17 SSR markers



# 2009 Wheat Stem Rust Observations in the U.S.

Prepared by USDA-ARS Cereal Disease Laboratory, St. Paul, MN  
([Click dots on the map to see more detailed information](#))

*To ensure you are viewing the latest map, please empty your browser's cache.*



Date\*

Location

Field/Plot

Cultivar/line

Race(s) identified