Recovery Plan for Stem Rust of Wheat caused by *Puccinia graminis* f. sp. *tritici* Ug99 (race TTKSK) and its derivatives

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Photos: T.D. Murray

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World Class. Face to Face.

Stem Rust Recovery Plan

Working Group & Process

Selection of participants

- **Subject matter expertise**
- **Geographic representation from affected areas**
- **OPMP guidelines and working group suggestions**

Working Group comprised of positive responses to invitation

Conference calls for overview of plan, to identify writing groups by topic based on expertise, and discuss relevant issues

Stem Rust Recovery Plan

Working group members

Heyward Baker	USDA-RMA	**Yue Jin**	USDA-ARS
Gary Bergstrom	Cornell University	**Marcia McMullen**	North Dakota State University
Bob Bowden	USDA-ARS	**Roger Magarey**	USDA-APHIS
Russ Bulluck	USDA-APHIS	**David Marshall**	USDA-ARS
Marty Carson	USDA-ARS	**Gene Milus**	University of Arkansas
Xianming Chen	USDA-ARS	**Chris Mundt**	Oregon State University
Erick DeWolf	Kansas State University	**Tim Murray**	Washington State University
Ruth Dill-Macky	University of Minnesota	**Pierce Paul**	Ohio State University
Chuck Divan	USDA-APHIS	**Kent Smith**	USDA-ARS, AO
Marty Draper	USDA-NIFA	**Mark Sorrells**	Cornell University
Jessica Engle	USDA-APHIS	**Brian Steffenson**	University of Minnesota
Prakash Hebbar	USDA-APHIS	**Jeff Stein**	South Dakota State University
Robert Hunger	Oklahoma State University	**Les Szabo**	USDA-ARS
Scott Isard	Pennsylvania State University	**Stephen Wegulo**	University of Nebraska

Stem Rust

Historically one of the most important wheat & barley diseases worldwide

In the U.S., upper Great Plains suffered greatest damage

- major epidemics in ND, SD & MN from 1935-50s resulted in 250 million bushel loss ($3.7B)

Effectively controlled since 1956 as a result of barberry eradication, effective disease-resistant varieties, and earlier maturity

➔ Why stem rust – why now?

Stem Rust and Ug99

Race TTKSK of stem rust

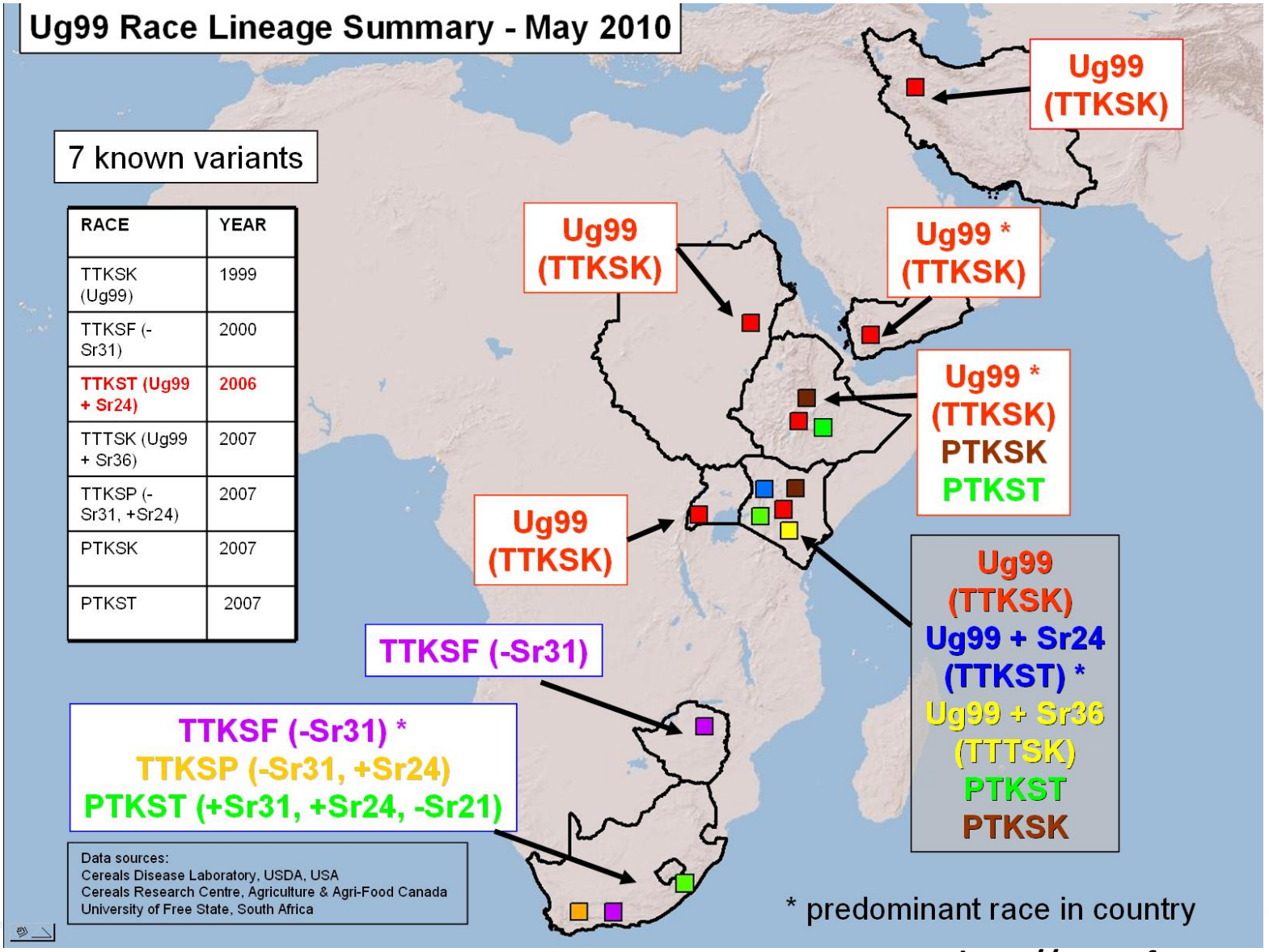
- 1st discovered in Uganda, 1999
- Able to overcome widely used disease resistance gene *Sr31*, and since then, *Sr24* & *Sr36*
- Ug99 has formed several new races with different virulence genes = lineage

➔ 80% of world wheat varieties are susceptible

- Spread within Africa and north to Iran

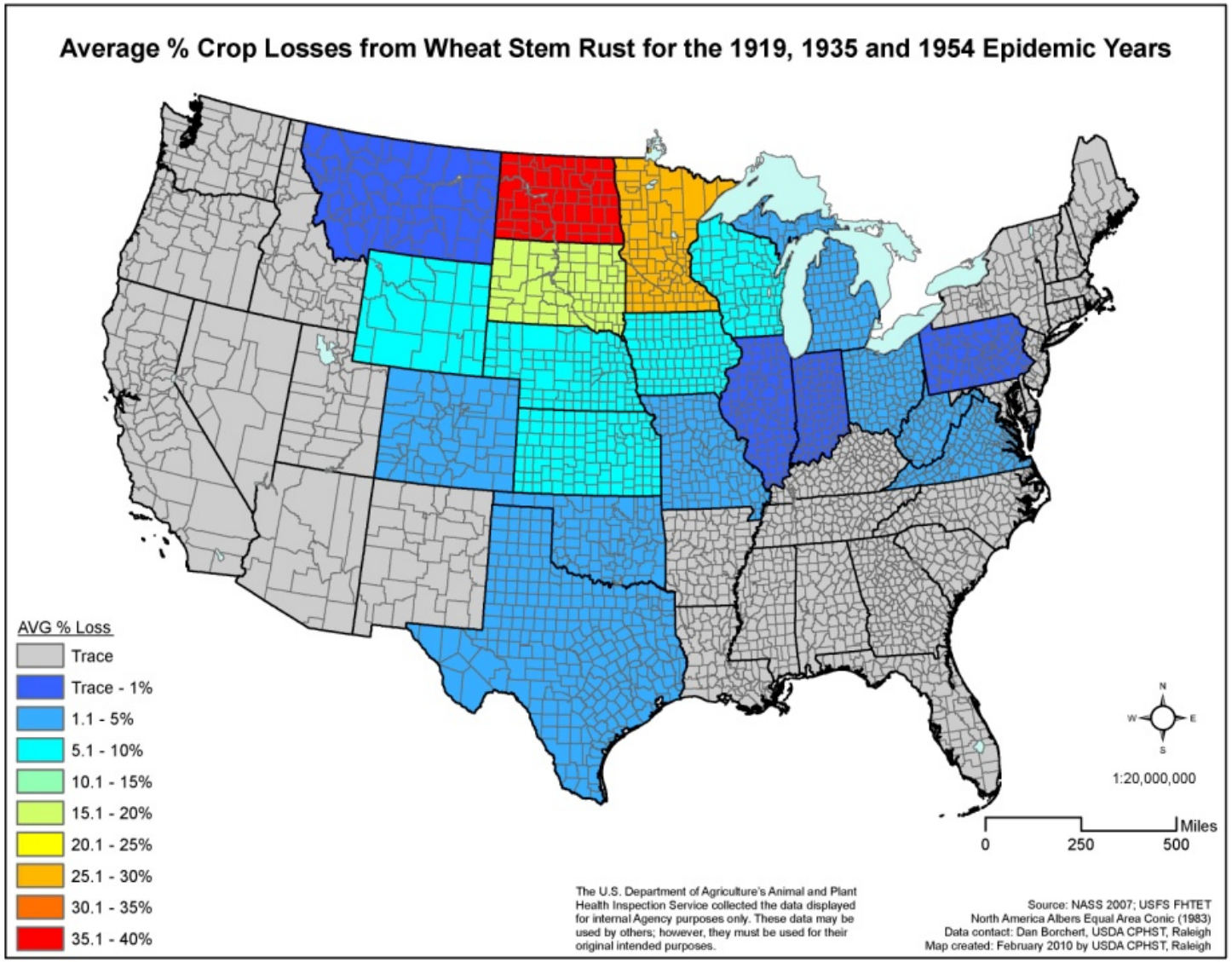
Unlikely to spread via natural means to North America

Spread of the Ug99 Lineage



http://www.fao.org

Potential Crop Losses due to Stem Rust



Stem Rust Recovery Plan Recommendations

Research

1. Breeding: incorporate existing and new resistance genes, characterize adult plant resistance, and screen breeding lines for genetic resistance to new and emerging races of stem rust.
2. Surveillance: develop new tools to rapidly identify new variants and augment the existing surveillance network.
3. Epidemiology: conduct studies to develop and verify disease prediction models, pathogen movement models, and role of barberry in pathogen survival.
4. Chemical control: identify fungicides, application timing and methods for most effective control along with decision support tools.

Stem Rust Recovery Plan Recommendations

Extension

1. Develop ‘Good Farming Practices’ tools to help with risk management.
2. Produce education and training materials for farmers and agriculture professionals to help them diagnose and control stem rust.
3. Further engage the National Plant Diagnostic Network (NPDN) by developing a Standard Operations Protocol (SOP) for diagnostics.