Dedication: Sam Kilonso (1964-2012)

A man who welcomed everyone with a huge smile and a warm heart. Someone who made a huge contribution to rust surveillance work in Kenya.
Tracking the wheat rust pathogens

Outline
Global Rust Monitoring: The Catalyst – “Ug99”

- Isolate Ug99 – race TTKSK
- Unique virulence. Large % of commercial cultivars susceptible
- Realization that we need a global system to detect and monitor new, virulent races of wheat rusts
What is Ug99?

- Not a single entity
- “Ug99 Race group”
- 8 known members
- 'the group of Pgt races sharing almost identical molecular fingerprints to the original Ug99 isolate (race TTKSK). Most races in the group have virulence to Sr31, but Sr31-avirulent progenitors/relatives are also included'.
The Surveillance Network

- Data poor to an increasingly data rich environment
- 2007 countries \( n = 2 \); 2012 countries \( n = 27 \)
- Contributing surveys cover about 20% of global wheat area

An outstanding example of global collaboration
1999: race TTKSK “Ug99” identified

2012: 8 members of the Ug99 race group – we know what they are and where they are!

Spread throughout Africa and into Asia. Further spread very likely
Changing Pathogen Populations

- 2009/2010 Data
- Race TTKSK (original “Ug99” [red]) only predominates in Ethiopia
- Other Ug99 race group races predominate e.g., Sr24 variants
Keeping track of “lots” of data

- Data management system – The Wheat Rust Toolbox (also South Asia Toolbox) – collaboration with GRRC and Sathguru
- Surveys: 27 countries, 9000+ records
- Pathotypes: 21 countries, 1075 isolates
Data Management: Wheat Rust Toolbox

NB: Generic - Applicable to all rusts

On-line Data Entry

Smartphone survey tool

Quality control/publish

User Management

Wheat Rust Toolbox

Crop Problem Dbase
(survey, pathotypes, [Trap nursery, Molecular])

Outputs:
- Survey Mapping
- Pathotypes, +...

Data Export / Exchange

External Applications e.g., RustMapper
Registered User content – Toolbox Adding value

- On-line data entry (or smartphone / tablet app)
- Quality control
- Automatic, rich content, country-specific graphical display out (tables, graphs, maps)
Public Information Systems: WWW Rust Tracker.org

- **Aim:**
  - Single source of up-to-date information for all global wheat rust monitoring activities

- **Content:**
  - Country-specific info: 38 countries
  - Dynamic tools – Wheat Rust Toolbox driven

www.rusttracker.cimmyt.org
Rust Tracker.org / Toolbox – Platform for all rusts

- All examples show Yellow Rust
- Increased focus on other rusts
Integrated Information Resources

Rust Tracker

Wheat Atlas

WheatRust.org

GlobalRust.org

Wheat Rust Toolbox

Survey Dbase

Barberry Dbase

Pathotype Dbase

Molecular Dbase

Trap Nursery Dbase

CIMMYT Cultivars Dbase

Wheatpedigree.net Cultivars Dbase

Contacts Dbase

Screening Nursery Dbase
New activities

- Epidemiological modelling + early warning (Cambridge Uni. / Rothamsted)
- Expanded focus on other rusts
- More integrated tools and data sets (Molecular data, trap nursery, Barberry surveys, Screening nursery……)
- SMS networks – extension / farmer early warning systems (FAO)
Summary

- Now have a fully operational global disease monitoring system.
- Surveillance and monitoring network, covering 35 countries and a large proportion of the developing world wheat area.
- Tracked the spread and status of important stem rust races e.g., "Ug99 race group".
- A robust and functional data management system - the Wheat Rust Toolbox - is now in place.
- Global collaboration is ensuring that key databases are shared and being integrated into different information platforms.
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