



ACIAR Iraq Project Review



Genetic Enhancement

Richard Brettell

ICARDA, Aleppo, 14 April 2008



Genetic Enhancement

Genetic enhancement work at ICARDA is focused on the mandate crops:

- Barley
- Wheat (regional)
- Chickpea (kabuli type)
- Lentils
- Faba bean
- Grass pea



Genetic enhancement

Genetic enhancement is managed in the Biodiversity and Integrated Gene Management Program (BIGM)

Integrated Pest Management

Genetic Resources

Biotechnology

International Nurseries

Human Resources Development

Seed Systems

Seed Health



Genetic Enhancement

Barley

*Stefania Grando, Flavio Capettini, Basudeb Sarkar
Salvatore Ceccarelli (consultant)*

Global responsibility.

Crop grown on 56 million hectares

Much of this is dryland, often in marginal environments

Grain used as feed for livestock, malt and human food

Straw used as animal feed, stubble for grazing



Barley breeding: our products

- Barley genetic stocks produced and distributed worldwide
 - International yield trials
 - International nurseries
 - Germplasm pools
 - Country specific nurseries
 - Special requests
- Knowledge and methodologies



Barley: new sources of resistance

Wide array of barley germplasm, including wild relatives, evaluated for:

- Barley yellow dwarf virus
- Scald
- Powdery mildew
- Net blotch
- Fusarium head blight
- Russian wheat aphid
- Cereal leaf beetle
- Cereal leaf miner





Genetic Enhancement

Wheat

Osman Abdalla (bread wheat), Miloudi Nachit (durum)

Mesut Keser, Francis Ogbonnaya

Regional mandate, in cooperation with CIMMYT through the ICARDA-CIMMYT wheat improvement program (ICWIP)

Responsibility for the improvement of durum and bread wheat within Central and West Asia and North Africa (CWANA)

Production systems in CWANA vary from irrigated to completely rainfed, but still most (approximately 70% is rainfed)



Selection for Rust Resistance



Susceptible

Resistant

Susceptible



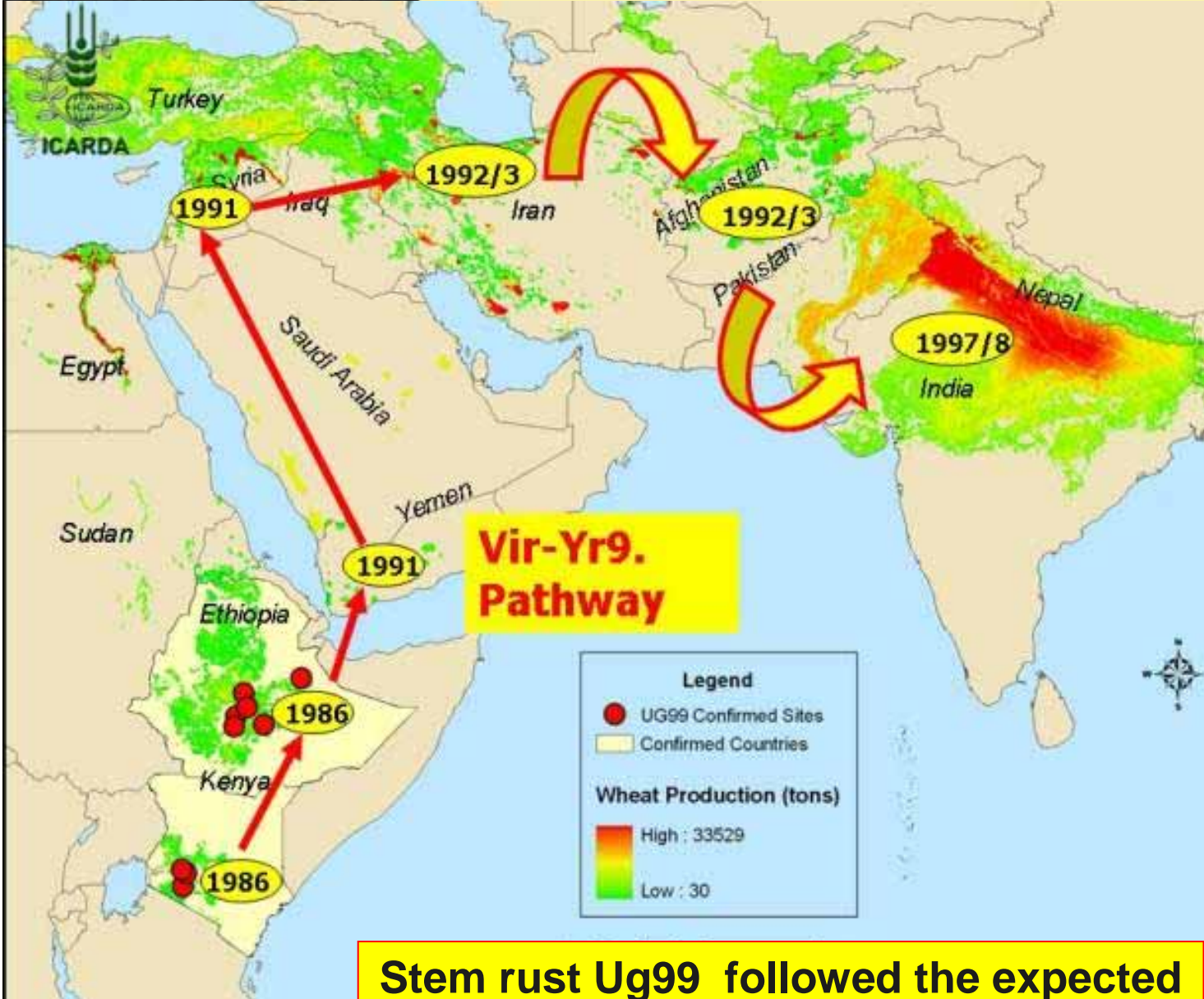
**Stem Rust Resistance Screening at
Debre Zeit, Ethiopia, 2007**





Yellow rust (Vir. Yr9) spread 1986-1998

Major yield losses recorded across the region



Stem rust Ug99 followed the expected



Screening for resistance to Stem rust in Kenya

Nursery	Total Number	Number of Resistant Lines	
		Resistant	Moderate
Egypt-Nursery	183	23	35
Iran-Nursery	278	20	26
Turkey-SBW Nursery	140	2	6
Ethiopia	100	10	18
Pakistan	115	2	5
Azerbaijan-DW	14	3	2
Azerbaijan-BW	83	0	2
Russia (historical lines)	54	0	3
Uzbekistan	15	0	2
Kazakhstan	15	0	3
Tajikistan	23	1	0
Nepal	101	0	2



Genetic Enhancement

Chickpea (kabuli type)

Rajinder Malhotra, Muhammad Imtiaz

Lentil and grasspea

Ashutosh Sarker, Geletu Bejiga

Faba bean

Fouad Maalouf



Improved Genetic Stocks of Lentil

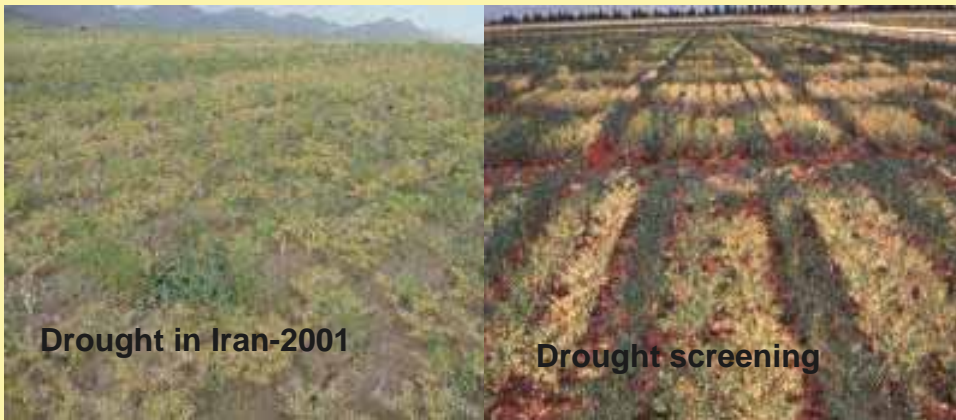
- Allele mining and use for high yield potential, combined resistance to Rust, Stemphylium blight and Vascular wilt diseases, and Sitona weevil
- Enhancing drought and heat tolerance, and winter-hardiness





Improved Genetic Stocks of Kabuli Chickpea

- Identification of new sources of resistance in wild relatives and landraces for cold, drought, nematodes, viruses, Ascochyta blight and Fusarium wilt.
- Gene pyramiding for multiple stress resistance

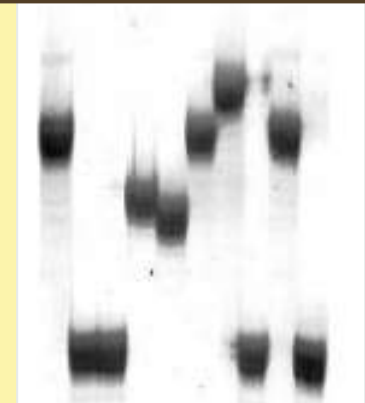
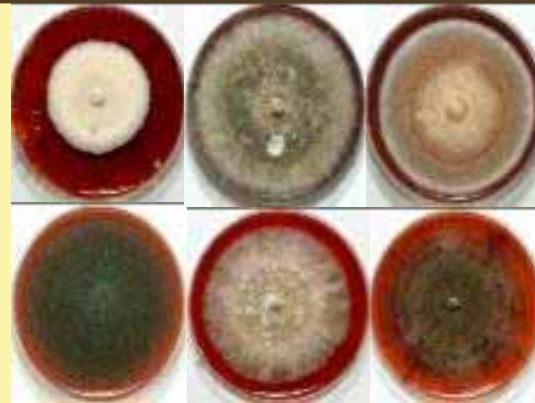
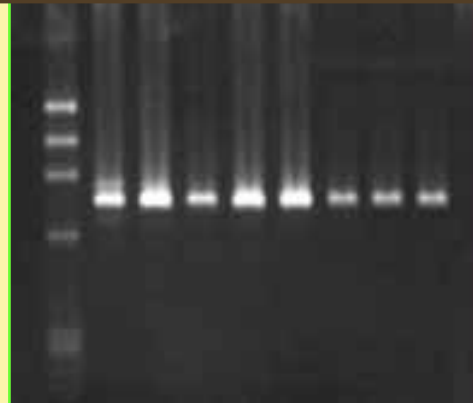


Ascochyta blight screening at Tel Hadya



Pest and pathogen genetic variability elucidated and integrated pest management (IPM) options developed

Virulence surveys conducted and genetic diversity of food legume fungal diseases (Ascochyta blight, fusarium wilt of chickpea, chocolate spot of faba bean) and viruses (Bean leaf roll virus, Soybean dwarf virus, Chickpea chlorotic stunt virus) studied





Genetic Enhancement

Forage legumes

Work is concentrated in the Diversification and Sustainable Intensification of Production Systems (DSIPS) Program

Emphasis is on exploitation and fitting to prevalent farming systems for different end uses