

International collaboration introducing improved germplasm of cereals and legumes in Central Asia and the Caucasus in the context of climate change

Ram Sharma et al.

ICARDA Regional Program for Central Asia and the Caucasus, Tashkent, Uzbekistan



Food Security in CAC



Wheat and food security in CAC

- All countries in CAC, except Kazakhstan, import wheat
- Wheat imports rank highest among commodities in terms of both quantity and value

Constraints to wheat production under climate change

ICARDA





Scope of presentation

- Yellow rust resistant winter wheat varieties
- Salinity tolerant winter wheat varieties (also frost, heat and drought tolerance)
- Cold tolerant chickpea varieties
- Linking new varieties to CRP 1.1 activity

Importance of wheat yellow rust in Central Asia Six yellow rust epidemics since 1999 1999, 2003, 2005, 2009, 2010, 2013





Breakdown of resistance in major varieties in Uzbekistan

Name of variety	Year of release	Level of yellow rust severity when released	Year when became susceptible to yellow rust	Level of yellow rust severity at present
Kroshka	2000	5 MR	2009	100 S
Polovchanka	1999	10 MR	2009	100 S
Pamyat	2006	R	2010	100 S
Moskvich	2007	R	2009	100 S
Krasnodar99	2006	R	2009/2013	60 S / 100 S
Tanya	2006	R	2009/2013	60 S / 80 S
Chillaki	2002	20 MR	2009	100 S
Bobur	2006	20 MR	2009	80 S

Yellow rust on leading commercial winter wheat cultivars

Country	Variety	Stripe rust severity (%)
Kazakhstan	Almali	40 MS
Kyrgyzstan	Azribos	40 MR
Tajikistan	Navruz	90 S
Turkmenistan	Bitarap	60 S
Uzbekistan	Krosnodar 99	100 S
Armenia	Bezostaya 1	50 S
Azerbaijan	Azamatli 95	70 S
Georgia	Bezostaya 1	70 S





Germplasm Introduction: 2012-2013

<u>Ø</u> 9

Crop	Nursery		Number of entries
	Number	Set	
Bread Wheat	16	69	1212
Durum	5	30	514
Barley	9	48	685
Chickpea	12	76	476
Lentil	12	55	401
Faba bean	3	4	65
Grasspea	4	11	85
Total	61 (293	3438



Natural epidemics of yellow rust in winter wheat nurseries in Tajikistan, 2013

6/05/2013





New, improved wheat varieties, resistant to yellow rust



Varieties that survived three yellow rust epidemics (2009, 2010, 2013)



Hazrati Bashir (local name)= AGRI/NAC//MLT/5/GOV/AZ//MUS/3/D ODO/4/BOW/6/VORONA/TR810200 (TCI992366: -030YE-0E-4E-0E-2E-0E)



Gorgon (local name) = AGRI/BJY//VEE/3/AKULA/4/F10S-1 (TCI972515: -0SE-0YC-0YE-26YE-0YE-1YE-0YE)

Varieties that survived two yellow rust epidemics (2010, 2013)

Bunyodkor



DORADE-5//KS82117/MLT TCI-02-88: -0AP-0AP-19AP-0AP-3AP-0AP

Chumon



YMH/HYS//HYS/TUR305 5/3/DGA/4/VPM/MOS/5/5 /TAM200/KAUZ (TCI-02-138: -0AP-0AP-7AP-0AP-5A-0AP)

To be named



Milan/Kauz//HD29/2*We aver (CMSS97M00541S -020Y-030M-040SY-020M-27Y-010M-0Y-0SY)

Hazrati Bashir (Uzbekistan

High yieldYR resistanceAmong earliest maturing

Elomon, Ozbekstand

Suitable for fewer irrigation

Chumon (Taj Katan) Resistant to yellow rust during 2010, 2013 epidemics Resistant to leaf rust Resistant to tan spot





Agronomic performance of yellow rust resistant lines

- Grain yield: 6 to 8 t/ha ('>' than or '=' to checks)
 Comparable to or better than checks for
 - Grain appearance
 - Maturity
 - 1000-kernel weight
 - Plant height
 - Protein and gluten content
 - Agronomic score

Identification of Yellow Rust Resistant Winter Wheat Genotypes

• Further information on yellow rust resistant varieties available in the following two publications

Euphytica (2011) 179:197–207 DOI 10.1007/s10681-010-0305-x

Improving wheat stripe rust resistance in Central Asia and the Caucasus

Z. M. Ziyaev · R. C. Sharma · K. Nazari · A. I. Morgounov · A. A. Amanov · Z. F. Ziyadullaev · Z. I. Khalikulov · S. M. Alikulov

2011

Improved winter wheat genotypes for Central and West Asia

R. C. Sharma, S. Rajaram, S. Alikulov, Z. Zivaev, S. Hazratkulova, M. Khodarahami, S. M. Nazeri, S. Belen, Z. Khalikulov, et al.

ISSN 0014-2336

2013



D Springer





Farmers' Field Day – 4 June 2013 Wheat Seed Multiplication, Tajikistan

Seed multiplication plan 2013-2014

Variety	Uzbeki stan (ha)	Tajikista n (ha)
	100	
Hazrati Bashir		
Elomon	150	
Gozgon	100	
Bunyodkor	200	
Yaksart	500	
Chumon		7
Alex		558
Ormon		435
Total	1050	1000



CRP 3.1 WHEAT Partners' Grant Uzbekistan + Tajikistan



Salinity tolerant, improved quality winter wheat for Central Asia

- Special project, 2010-2014
- Funded by BMZ/GIZ
- Project partners
 - ICARDA
 - Kashkadarya Research Institute, Uzbekistan
 - Urgench State University/KRASS, Uzbekistan
 - Krasnovodapad Breeding Station, Kazkahstan
 - Grain Research Institute, Turkmenistan
 - Bonn University, Germany





Kashkadarya, Uzbekistan







Khorezm, Uzbekistan

17 tolerant genotypes selected





Autumn Planted Chickpea Emerging technology in Central Asia



Planted on 19 Dec, crop on 24 Mar



Planted on 19 Dec, crop maturity in May



Autumn vs. spring planting



Winter-kill of susceptible lines

Out-scaling cold tolerant chickpea in Tajikistan (2010-2012)

Varieties: Sino, Hisor-32

REPUBLIC OF TAJIKISTAN





Interphase with CRP 1.1 Wheat varieties



Integration with CRP1.1

Frost damage, Uzbekistan, 2013

2013-

17 tolerant genotypes planted for

Aral Sea Action Site



Integration with CRP1.1, Tajikistan

Chickpea 'Sino' and 'Hisor-32'

Rasht Valley: 2013 Fergana Valley:2013-14



Integration with CRP1.1, Tajikistan

Barley 'Pulodi'

Fergana Valley:2013-14





Summary

- Yellow rust resistant winter wheat varieties increasingly becoming available to the farmers
- Salinity tolerant wheat varieties in the final stage of evaluation and seed multiplication
- Some success on frost tolerant wheat varieties
- Cold tolerant chickpea varieties expanding to smallholders' farms
- Newly released varieties and candidate cultivars of wheat, barley and chickpea being utilized in CRP 1.1 action sites

Acknowledgement to partnership



