



# **Wheat production in Central Asia: current status and opportunities for sustainable production**

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**CIMMYT-China and CIMMYT-Turkey**

# CIMMYT

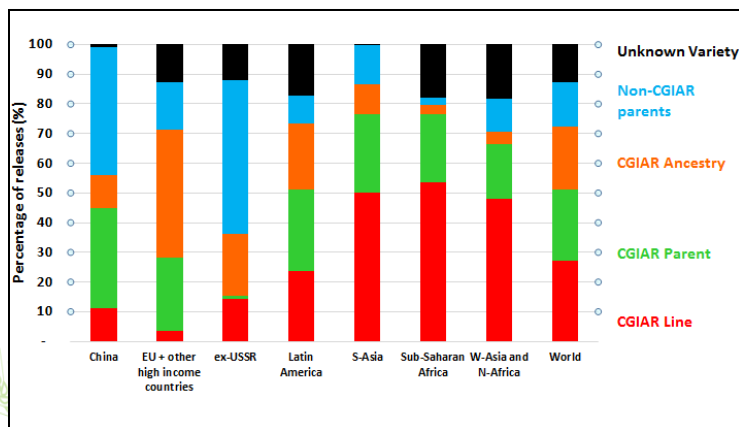
- CIMMYT is international non-profit non-government research organization with headquarters in Mexico and offices in 18 countries globally
- CIMMYT main goal is improvement of wheat and maize production through new varieties and technologies globally with emphasis on less developed countries
- CIMMYT celebrated 50 years Anniversary end of September, 2016



# CIMMYT

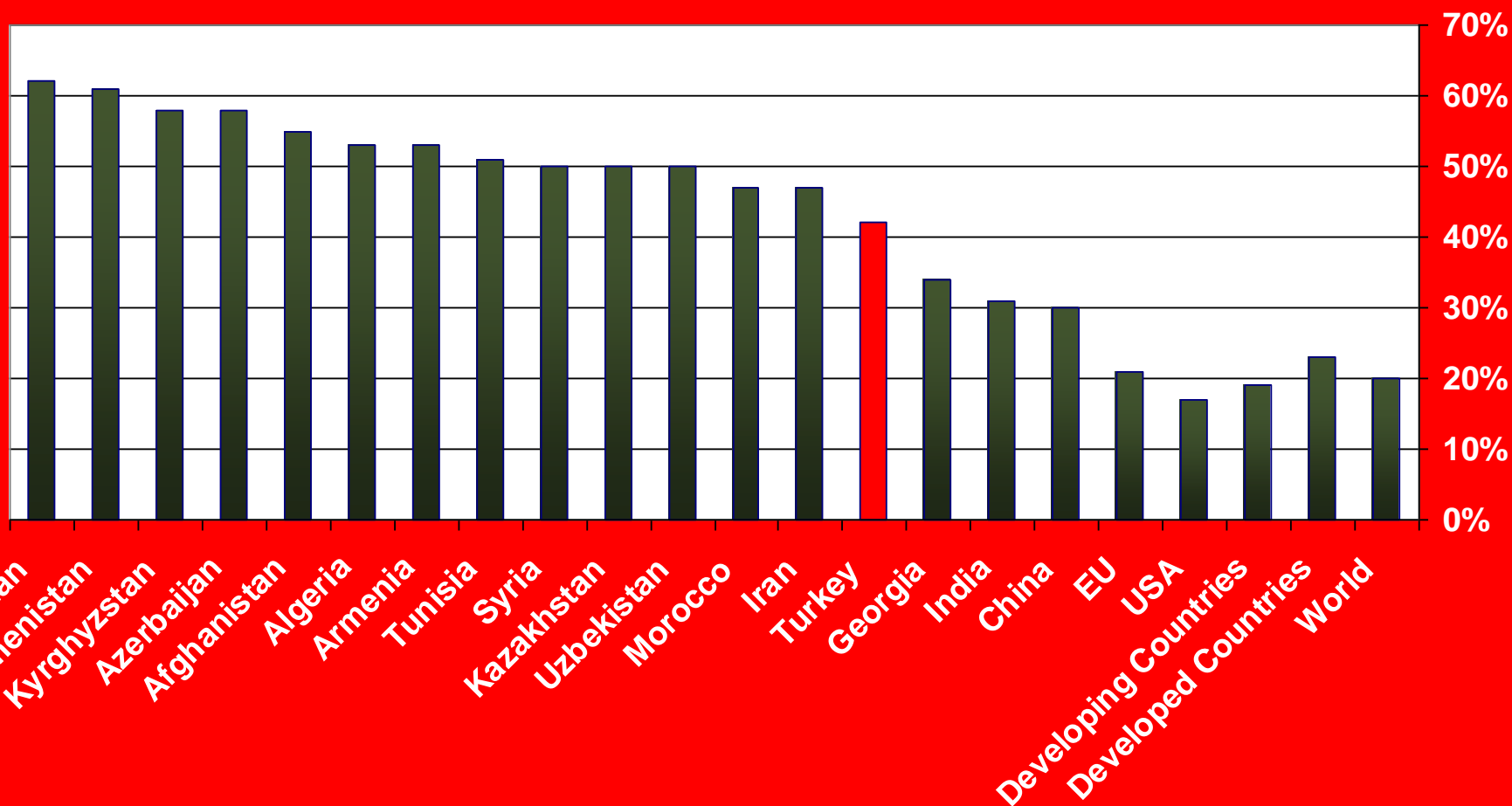
- Global Wheat Program
- Global Maize Program
- Conservation Agriculture
- Genetic Resources
- Socio-Economic Program
  
- US\$150 mln annual budget
  - USAID
  - CGIAR
  - Bill and Melinda Gates Foundation
  - Mexico
  - Australia
  
  - Turkey
  - Russia
  - Kazakhstan

Director General:  
Martin Kropff



Global Wheat Program Director:  
Hans-Joachim Braun

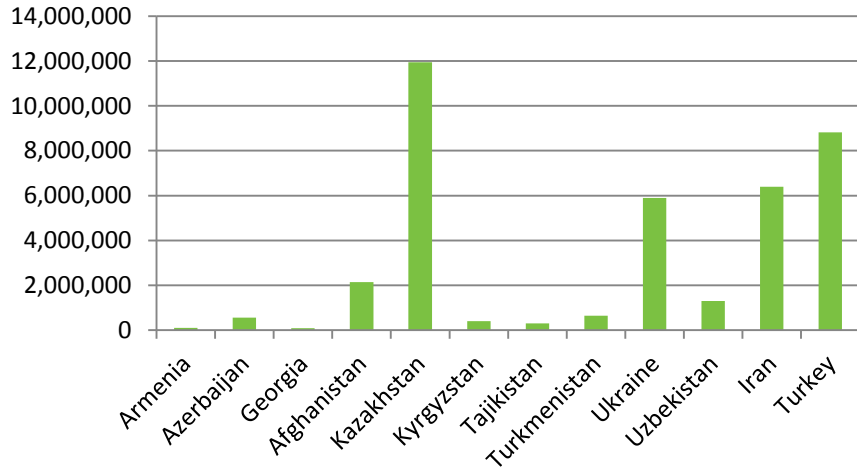
# % daily calories from wheat



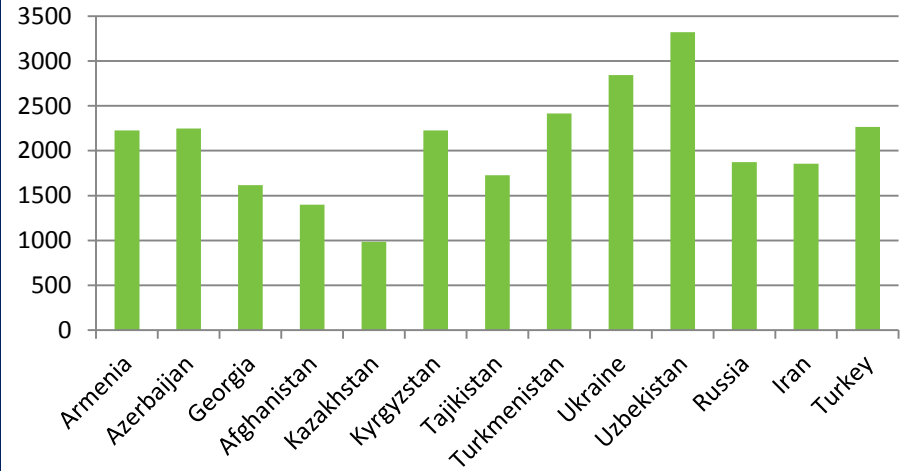
Source: FAO Database

# Regional wheat production statistics

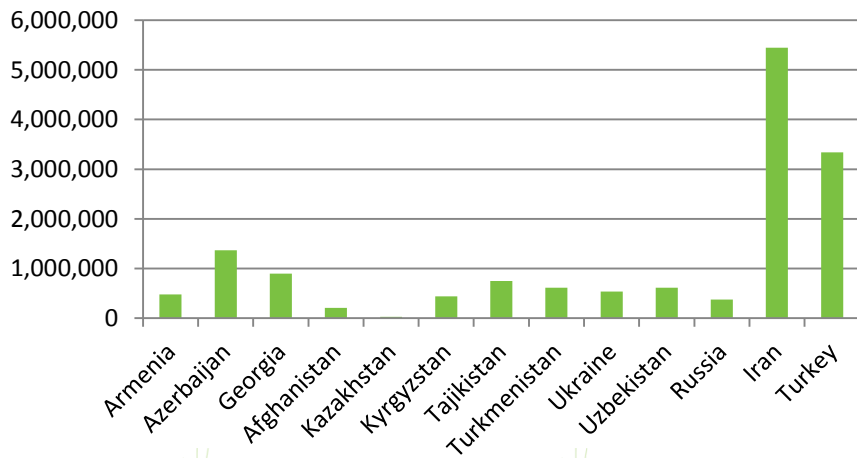
Wheat area, ha



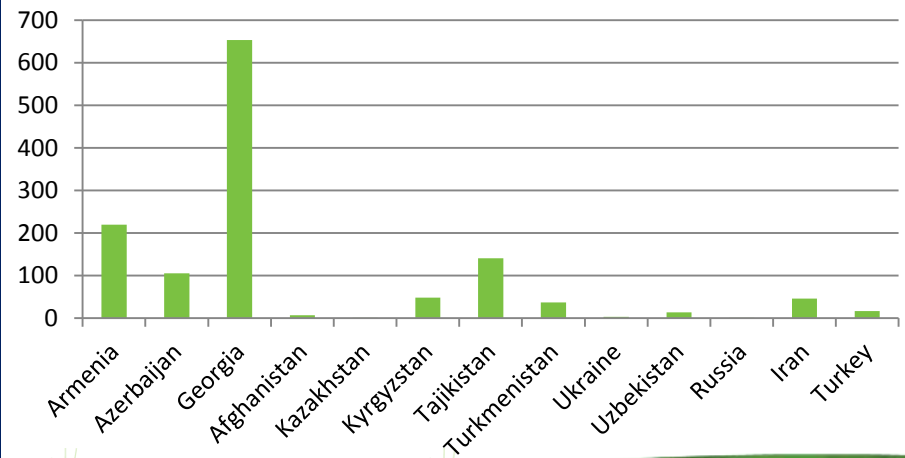
Grain yield, kg/ha



Wheat and wheat products import, t

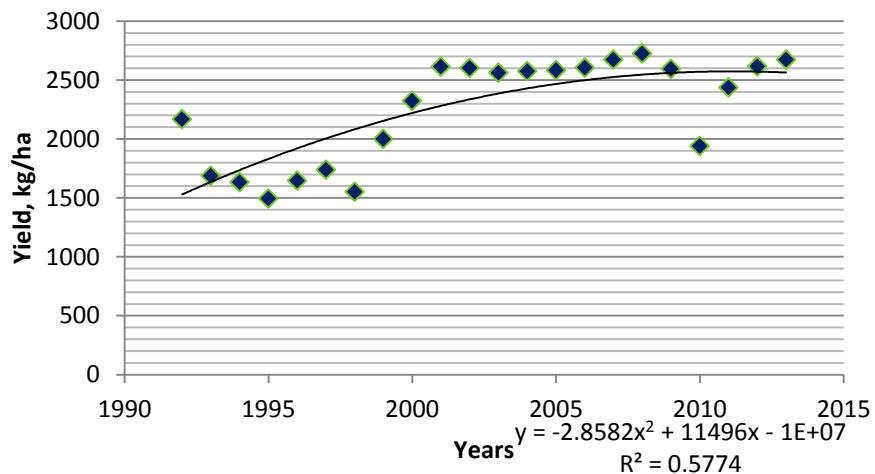


import 2012, % of production

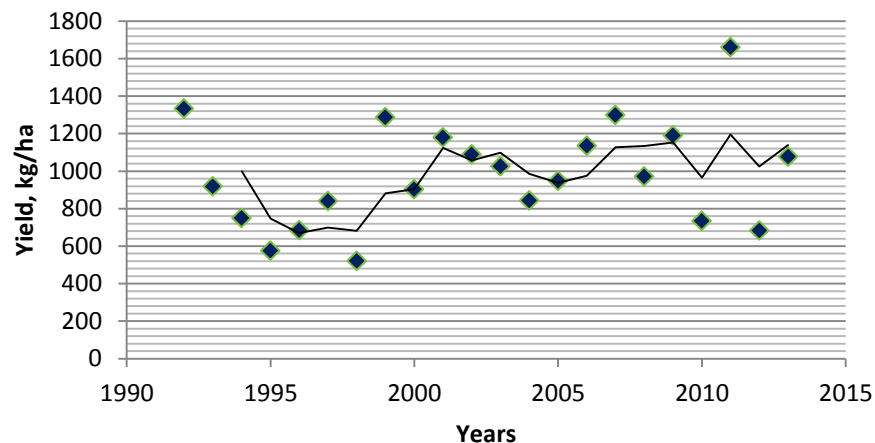


# Wheat yield gains: 1992-2013

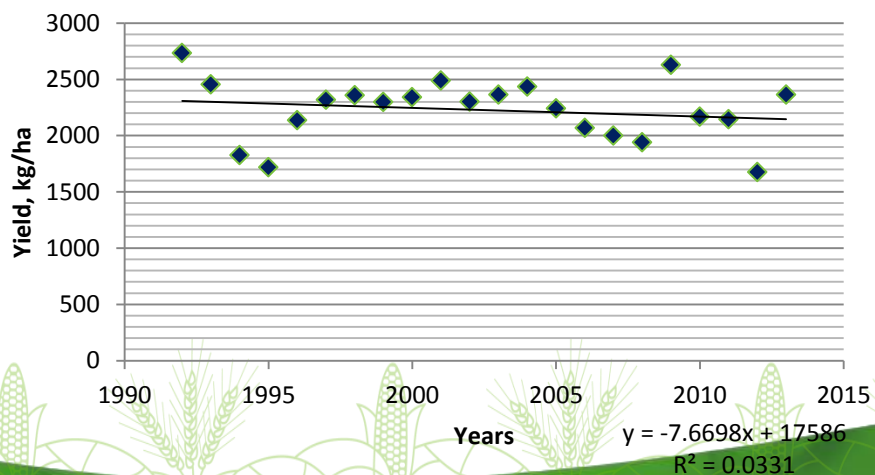
## Azerbaijan



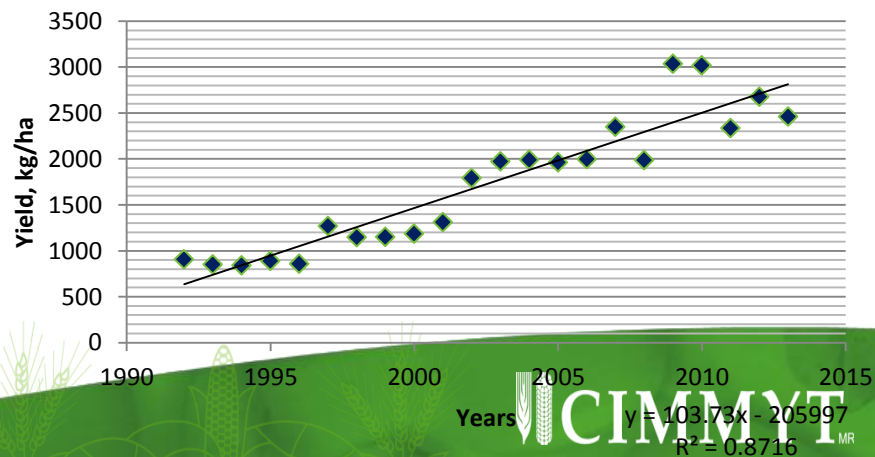
## Kazakhstan



## Kyrgyzstan

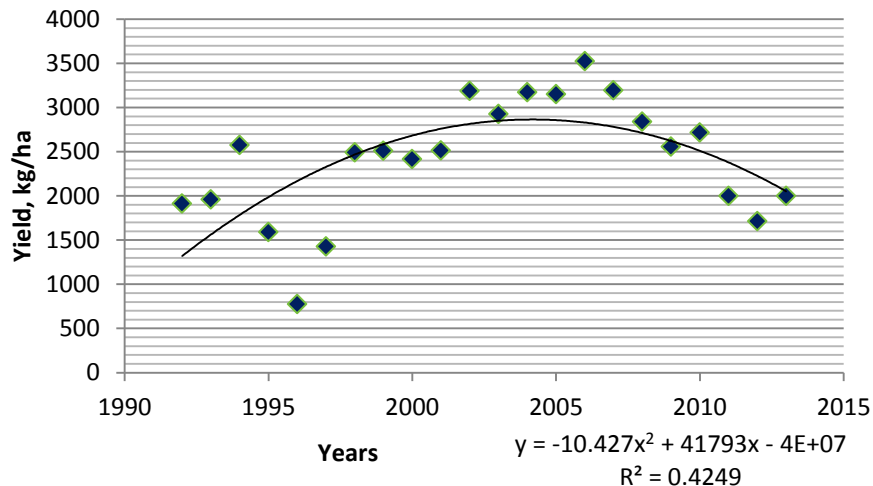


## Tajikistan

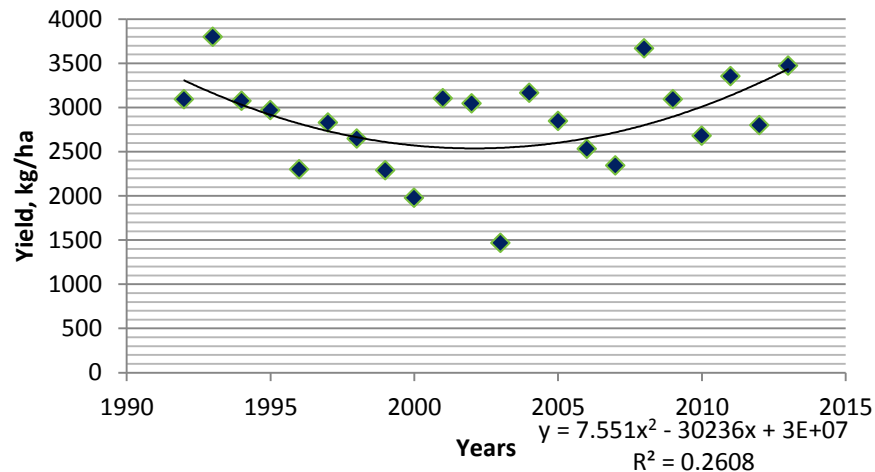


# Wheat yield gains: 1992-2013

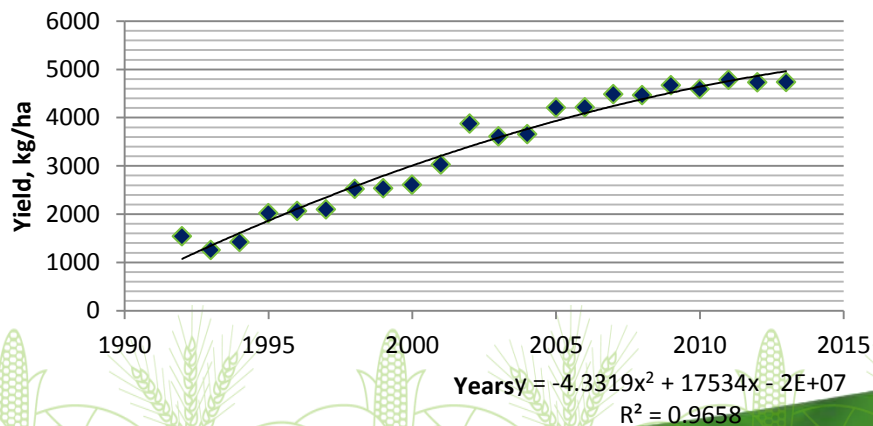
## Turkmenistan



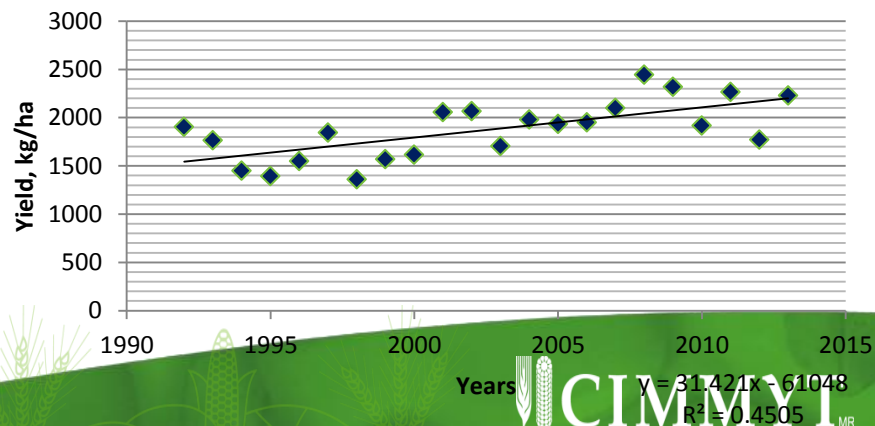
## Ukraine



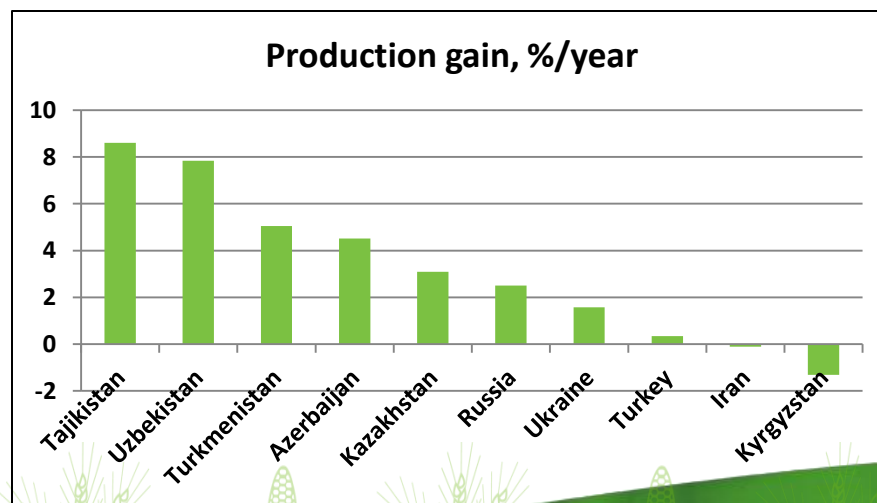
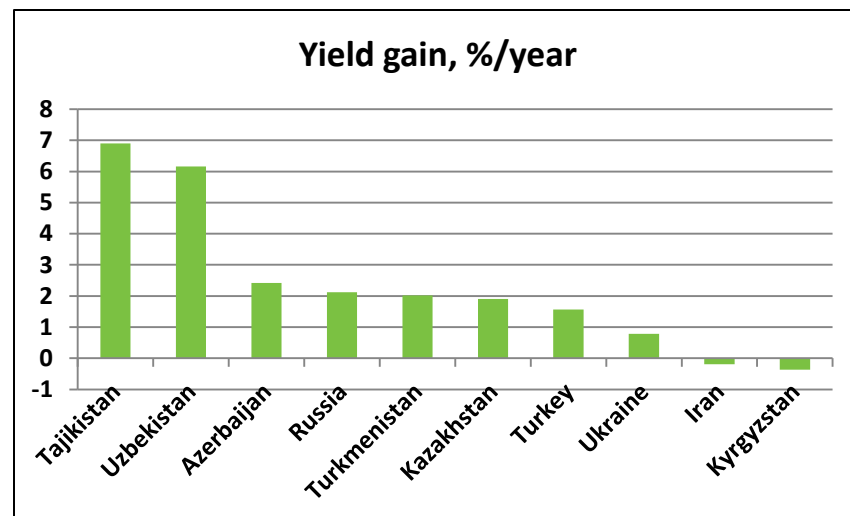
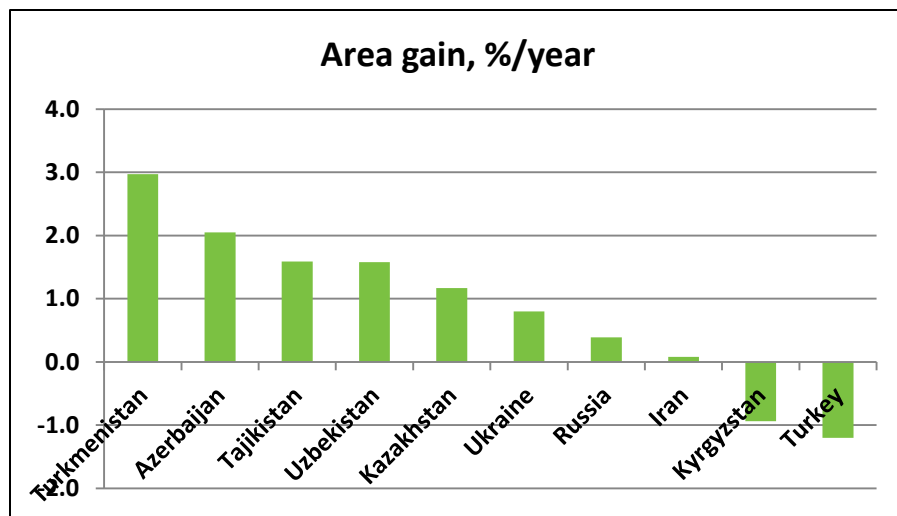
## Uzbekistan



## Russia



# Wheat production summary, 1992-2014

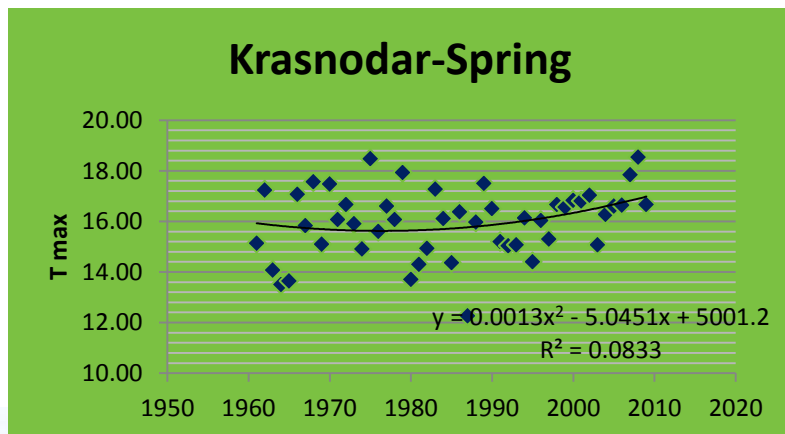




# Climate change at winter wheat breeding sites in central Asia, eastern Europe, and USA, and implications for breeding

*Euphytica* 2013, 194(2):277-292

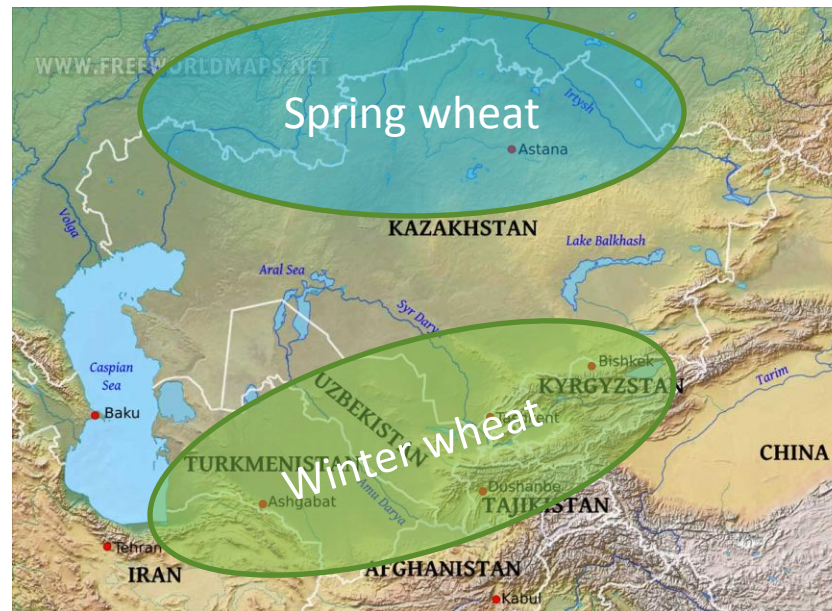
- Analysis of monthly Tmax and Tmin, precipitation from 1961 till 2009 at 36 winter wheat breeding sites in E. Europe, Central Asia, Turkey and USA



Region	Country: site	r <sup>2</sup> for average T max			
		Spring	May	Summer	June
Central Asia	AFG: Kabul	0.03	0.05	0.00	0.00
	KAZ: Almaty	0.07	0.03	0.11*	0.07
	KAZ: Red Fall	0.06	0.00	0.03	0.01
	KGZ: Bishkek	0.03	0.03	0.21**	0.08
	PAK: Quetta	0.06	0.13*	0.31***	0.10*
	TJK: Hissar	0.05	0.01	0.13*	0.03
	TKM: Ahal	0.16**	0.02	0.37***	0.18**
	UZB: Gallyaoral	0.03	0.01	0.10*	0.03
	UZB: Karshi	0.06	0.01	0.15**	0.05
Caucasus	ARM: Yerevan	0.00	0.03	0.02	0.02
	AZE: Gobustan	0.04	0.00	0.14*	0.07
	GEO: Mtskheta	0.02	0.03	0.08	0.02
Eastern Europe	BGR: Sadovo	0.06	0.07	0.30***	0.22***
	HUN: Martonvasar	0.10*	0.11*	0.26***	0.08
	MOL: Beltsy	0.06	0.03	0.19**	0.03
	ROU: Calarasi	0.08	0.09*	0.31***	0.17**
	RUS: Krasnodar	0.05	0.01	0.14*	0.02
	SRB: Novi Sad	0.09*	0.12*	0.25***	0.18**
	TUR: Edirne	0.08	0.09*	0.27***	0.20***
	UKR: Kharkov	0.09*	0.00	0.06	0.01
UKR: Odessa	0.09*	0.07	0.19**	0.05	
West Asia	IRN: Karaj	0.08	0.02	0.04	0.04
	IRN: Maragheh	0.03	0.00	0.03	0.01
	SYR: Aleppo	0.07	0.10*	0.26***	0.23***
	TUR: Ankara	0.01	0.04	0.19**	0.11*
	TUR: Diyarbakir	0.03	0.04	0.18**	0.13*
	TUR: Erzurum	0.03	0.03	0.22***	0.11*
	TUR: Eskisehir	0.12*	0.03	0.17**	0.18**
	TUR: Konya	0.01	0.02	0.15**	0.13*
North America	USA-CO: Fort Collins	0.12*	0.01	0.16**	0.06
	USA-CO: Akron	0.10*	0.03	0.08	0.04
	USA-KS: Hays	0.01	0.00	0.00	0.00
	USA-NE: North Platte	0.00	0.00	0.00	0.00
	USA-OK: Stillwater	0.02	0.01	0.02	0.01
	USA-TX: Bushland	0.00	0.00	0.02	0.01

# CIMMYT and Central Asia

- 1996-1998 - consultations on the research and development needs as part of CGIAR initiative
- 1999 – agreement with the Republic of Kazakhstan and establishment of regional office for Central Asia and Caucasus in Almaty
- 2004 – establishment of office in Astana, new capital of Kazakhstan



# CIMMYT and Central Asia: key cooperation areas and achievement

- Capacity building of young scientists in wheat improvement
  - In 2000-2005 more than 50 researchers from the region went through 3-6 months training in Mexico and now represent the backbone of wheat research system
- Establishment of linkages between the researchers in the region and their integration into global wheat research community
  - International Winter Wheat Improvement Program links all breeding and research programs of Central and West Asia, Caucasus and Eastern Europe
- Socio-economic studies
  - Wheat competitiveness assessment
  - On-farm wheat processing
  - New varieties impact study
- Development of new high yielding winter wheat varieties resistant to diseases
  - More than 20 varieties originating from CIMMYT-Mexico and from cooperative Turkey-CIMMYT-ICARDA program have been released and cultivated on area exceeding 1 mln ha

# Kazakhstan-Siberia Network on Spring Wheat Improvement (KASIB)

- Established in 2000
- Unites wheat breeding and research programs:
  - Russia – 12
  - Kazakhstan - 10
- Bread wheat (22 cooperators) and durum wheat (6 cooperators)
- Bi-annual replicated trial with each cooperator contributing 2-3 new lines or varieties
- Shuttle breeding with CIMMYT
- Research activities
- Huge impact



# Conservation Agriculture for Wheat Production in Kazakhstan

- ✓ In 2000s CIMMYT in cooperation with and support of FAO, World Bank, government, NARS, CGIAR centers, and farmers initiated large-scale Conservation Agriculture activities in Kazakhstan. The area under CA-based practices has been increasing from: **0 ha in 2001 to 2 150,000 ha in 2015**
- ✓ The utilization of CA-based technologies has become an official state policy in agriculture in Kazakhstan. Since 2008, the government of Kazakhstan has been **subsidizing farmers who are adopting CA-based technologies**
- ✓ With this Kazakhstan was ranked **7<sup>th</sup> in the world for No-till adoption**
- ✓ In terms of **speed of adoption** during the last three years, Kazakhstan has no rivals: **it appears to be the 1<sup>st</sup>.**
- ✓ **Increased income and food security during the last 3 years:**
  - An estimated **580 million dollars incremental income;**
  - Satisfied cereals requirements of about **5 million people annually**
- ✓ **Climate Change mitigation:** Kazakhstan contributes to the annual sequestration of about **1.8 million tons of CO<sup>2</sup>**



(Sources: FAO Investment Centre, *Advancement and impact of conservation agriculture/no-till technology adoption in Kazakhstan, December, 2012*; MoA, CIMMYT-Kazakhstan, 2015)

**Crops lands areas under different technologies in Kazakhstan**



<i>Technology</i>	<i>Area, mln ha</i>					<i>Operations</i>
	<i>2005</i>	<i>2008</i>	<i>2011</i>	<i>2014</i>	<i>2015</i>	
Conventional	14.0	11.6	8.5	7.7	6.7	Multiple tillage trips with blades and sweeps, (mostly monocropping system)
Minimal tillage	4.7	6.2	8.9	9.3	10.5	Direct seeding with V-shaped openers or with narrow chisels regularly combined with shallow harrowing/cultivation, (few diversification)
No-tillage	0.3	1.2	1.6	2.0	2.15	Direct seeding with narrow chisels or double discs openers (diversification)



# CIMMYT and Central Asia: future directions

- Since 1999 the countries clearly diverged in their wheat production, technology development and application: while some made tremendous progress, others sustain or even decreased production.
- The wheat yield gap remains high and food security though improved still fragile
- Our aim is to work with wide range of stakeholders to maximize grain yield under irrigated conditions in sustainable manner while maintaining and improving end-use and nutritional quality
- Improvement of yield stability and water use efficiency under dryland conditions

# CIMMYT and Central Asia: future directions

- Wheat value chain analysis to maximize the profit of farmers and wheat industry as a whole
- Conservation agriculture for irrigated environments: MASAgro in Mexico is an excellent example
- New efforts for training wheat researchers are needed
- Capacity building in wheat breeding, wheat research and in taking new varieties and technologies to farmers
- Characterization and utilization of wheat genetic resources
- Application of new phenotyping and genomic tools in increasing breeding efficiency



# CIMMYT and Central Asia: future directions

- Funding to CIMMYT cooperation in the region was provided by:
  - CIMMYT
  - FAO
  - World Bank
  - USAID
  - GTZ
  - Melinda and Bill Gates Foundation
  - CRP WHEAT
  - Ministry of Agriculture, Republic of Kazakhstan
  - Ministry of Finance of Russian Federation through Eurasian Food Security Center
- As the region develops there is decline in funds allocation by traditional donors which is reflected in activities of all CGIAR centers working in the region including CIMMYT
- From wheat production and food security perspective we are still far away from reaching our goals and need to continue to work in this important region



Thank you  
for your  
interest!

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