Promoting conservation agriculture in Central Asia and the Caucasus

Nurbekov Aziz,
ICARDA-CAC

The regional challenges

- *Rapid growth of population followed by increasing demand for food and feed*
- *Area under irrigation has been increasing, but no more possible*
- *Arable land per capita is declining and competition for land and water is increasing*
- *Rising prices of inputs (fuel, fertilizer, seed, pesticides, etc.)*
- *Land degradation (salinization, soil erosion, waterlogging, overstocking and soil fertility decrease)*
- *…*

Conservation agriculture can address these challenges

What is Conservation agriculture?

Empirical and scientific evidence internationally shows ....

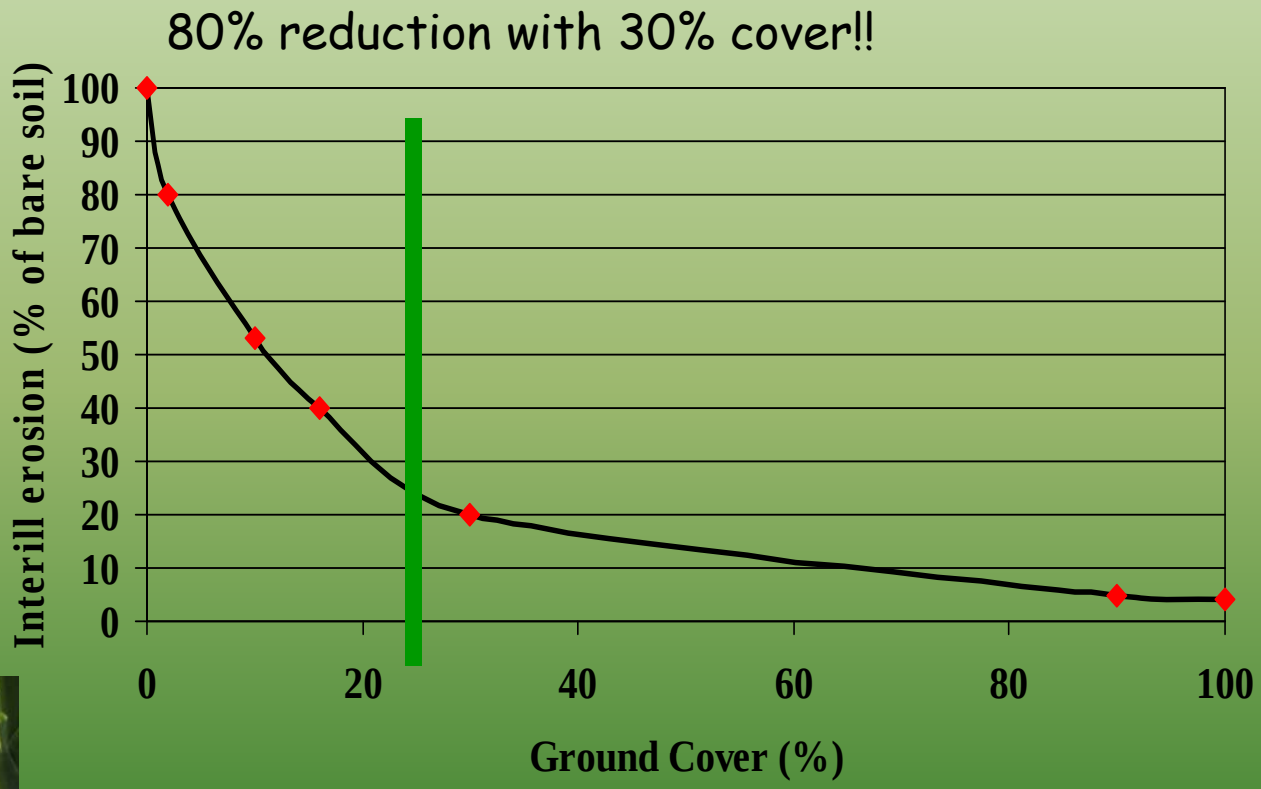
- **No or minimum mechanical soil disturbance by** – seeding or planting directly into untilled soil
- **Enhance and maintain organic matter cover on the soil surface** – using crop residues and cover crops to protect & feed soil life
- **Diversification of species** -- both annuals and perennials - in associations, sequences and rotations

Source: Amir Kassam 2013

CA impact on soil fertility and environment

Type of degradation	Conservation Agriculture impact
Soil salinity	❑ Reduced soil salinity was reported by Devkota (2011b) ❑ The differences in soil salinity at the end between conventional practices (0.52%) and NT (0.39%) were significant. After 4 years, NT system had the lowest soil salinity level (Nurbekov 2008 and Pulatov et al., 2012).
Soil organic matter	❑ Numerous results from the irrigated areas showed that crop residue retention improves SOM and soil N content (e.g. Egamberdiev, 2007; Nurbekov et al., 2012; Pulatov et al., 2012) ❑ In comparison, a wealth of information on CA practices worldwide shows an increase in SOM (e.g. West and Post, 2002; Sanchez et al., 2004; Govaerts et al., 2006; Corsi et al., 2012) and these results were also confirmed by selected studies in the irrigated areas in Central Asia
Soil Biodiversity & Biological activities	❑ CA positive effect on earthworm populations, with earthworm biomasses up to 80% higher
Soil Physico-chemical properties	❑ CA positive effect on soil aggregation + 60% (F. Tivet, Laos 2008) ❑ Under CA total exchange capacity + 50% (P. Lienhard, Laos 2013)

Soil Cover and Erosion



From Brady and Weil, 2002

Conventional agriculture

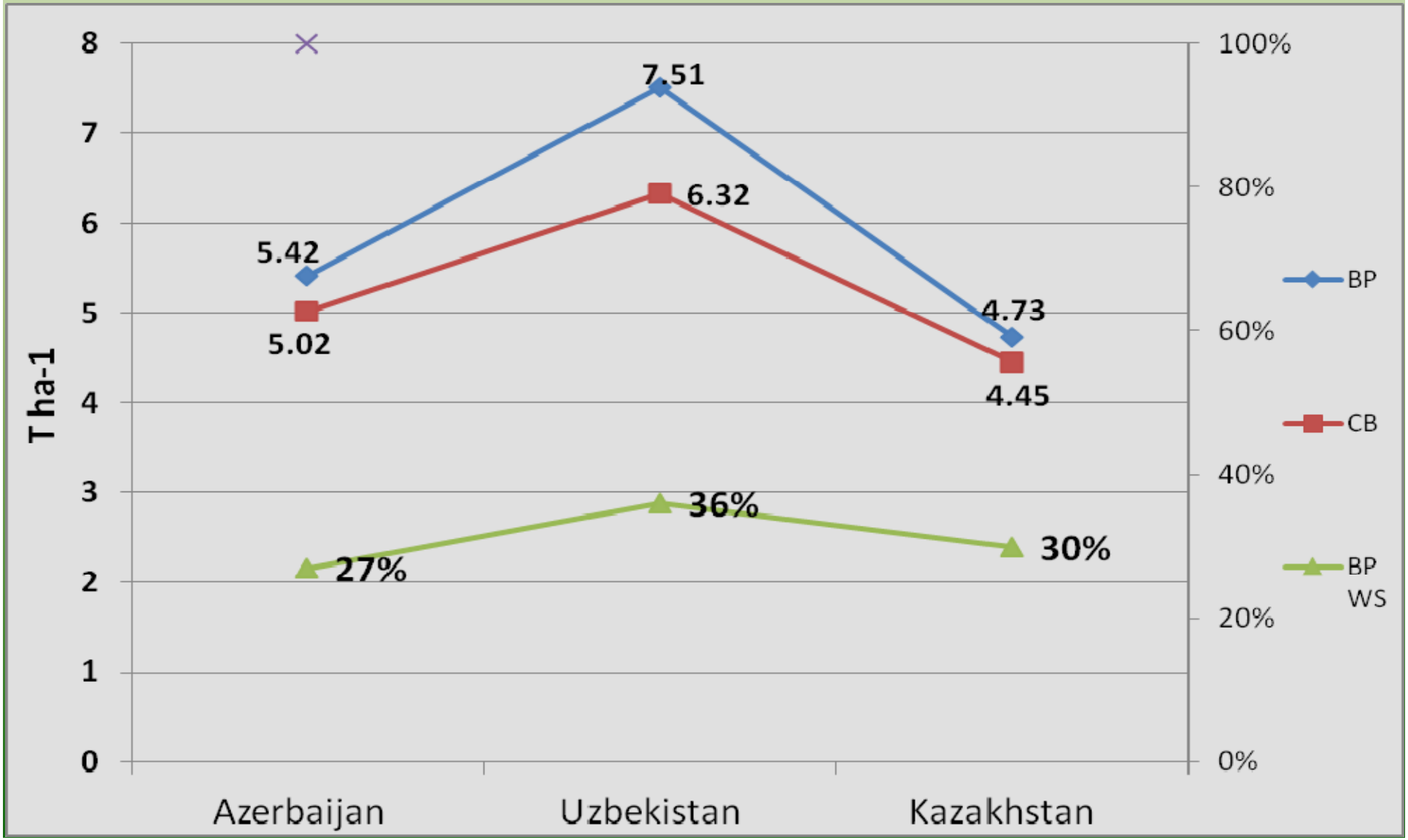
Conservation agriculture

Farm power and energy for field production can be reduced by up to 60% compared to conventional farming due to elimination of most power intensive operations, such as tillage, harrowing, chiseling and packing

Additional equipment investment, particularly the number and size of tractors; and labour use is reduced

Project Results

Wheat Yield Response to planting method (2011-2013)



Economics of planting methods on winter wheat productivity in Azerbaijan (2012-2013)

Planting methods and seeding rates	Grain yield, Mg ha^{-1}	Production cost 1$ ha^{-1}	Production value 1$ ha^{-1}	Net benefits, $	Profitability rate ,%
Conventional – 220 kg ha^{-1}	3.02	465	960	495	106
Bed – 130 kg ha^{-1}	4.29	535	1280	745	139

Comparison wheat and fuel prices in Kazakhstan (1982-2012)

Years	Wheat grain, usd/kg	Fuel usd/kg	Difference
1982	0.29	0.03	10:1
1997	0.06	0.06	1:1
2012	0.29	0.70	1:2.5

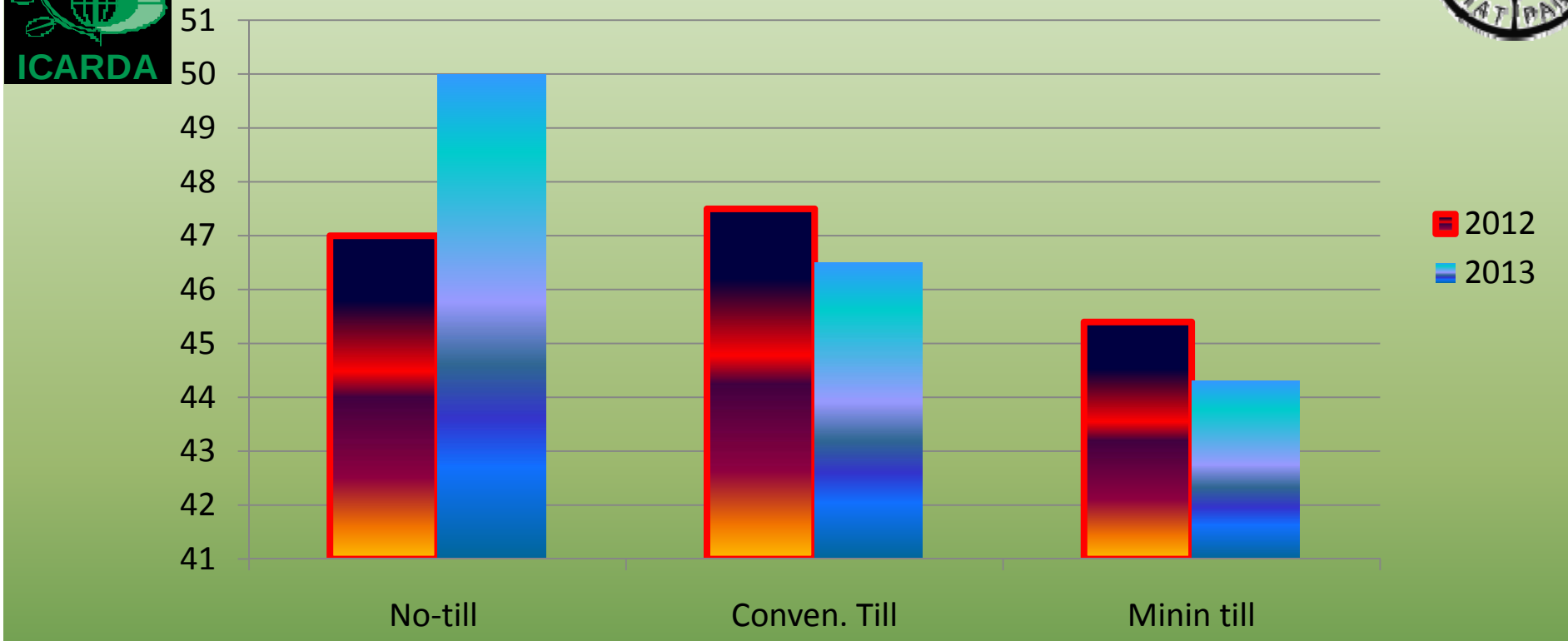
Source: Medeubaev 2013

Double crops will be essential to improve sustainability of farming and land use efficiency

Effect of no till succeeding maize in Azerbaijan (2011-2012)

Crops	Crop yield, t/ha			+-, t ha -1
	Winter wheat	Maize	Winter wheat+maize	
Winter wheat, control	**5.17**	**-**	**5.17**	**-**
Winter wheat + maize	**5.17**	**5.21**	**10.38**	**5.21**

Double cropped maize green mass yield affected by tillage method, t/ha, (Kazakhstan) 2012-2013



Mungbean grown as a catch crop with retention of surface residues in Karshi (2011-2013)

Planting method	Spent fuel for planting, l/ha	Root length, cm	Plant height, cm	Yield, t/ha
Conventional	**53.6**	**25.4**	**67.17**	**1.61**
No-till with 1 cultivation	**13.6**	**23.5**	**68.83**	**1.77**
No-till	**5.9**	**23.8**	**65.35**	**1.94**


ICARDA


F
A
O
FIAT PANIS

If CA is so good, why is it not spreading?

Adoption – Regionally

- Kazakhstan 1.7 million ha
- Uzbekistan 0.6 million ha minimum till wheat (only one year), including 1500 ha in rainfed area
- Tajikistan 25,000-50,000 ha minimum till wheat
- Azerbaijan 1246 ha on irrigated land
- Kyrgyzstan 700 ha
- Armenia no data
- Georgia no data
- Turkmenistan no data

ICARDA

Why has there been so little adoption of Conservation Agriculture outside the Kazakhstan?

Constraints - adoption of conservation agriculture

- Mind set – overcoming the culture of the plough.
- Lack of extension services throughout the region and lack of farmer expertise.
- Training needs larger than perceived
- Incentives in projects
- Lack of local manufacturers
- Limited number of publications CA
- Little or no mainstreaming of CA in National Programs
- Policy makers unaware of CA

Recommendations

- It will be helpful if the Governments would encourage the CA practices to enhance agricultural production and local production of CA equipment.

- Make a Special State decree on "Support the development of the zero till and direct planting practices" for wider adoption and increased effectiveness of CA.

Conclusions

CA -

- is responding to regional challenges
- is known in parts of the region
- is growing (Northern Kazakhstan)
- is productive and sustainable (win-win)
- is reserves soil degradation
- is saving resources including fuel, seeds and labour
- is suitable for local conditions and can provide similar or higher crop yields
- is requires supportive policies for accelerated adoption


ICARDA
Thank you