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# Impact of conservation agriculture practices for soil restoration under CACILM-2 project activities

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# Status and threats to land resources and barriers to INRM in Uzbekistan

- 82% of the national territory is affected by Desertification, Land Degradation and Drought, including loss of productivity
- 50.3% of irrigated lands are affected by salinization
- Over 50% of farmland suffers from wind and water erosion
- 3% of GDP is lost annually due to inefficient water resources management. The annual decrease in agricultural production is estimated to be USD2 billion (as of 2006)



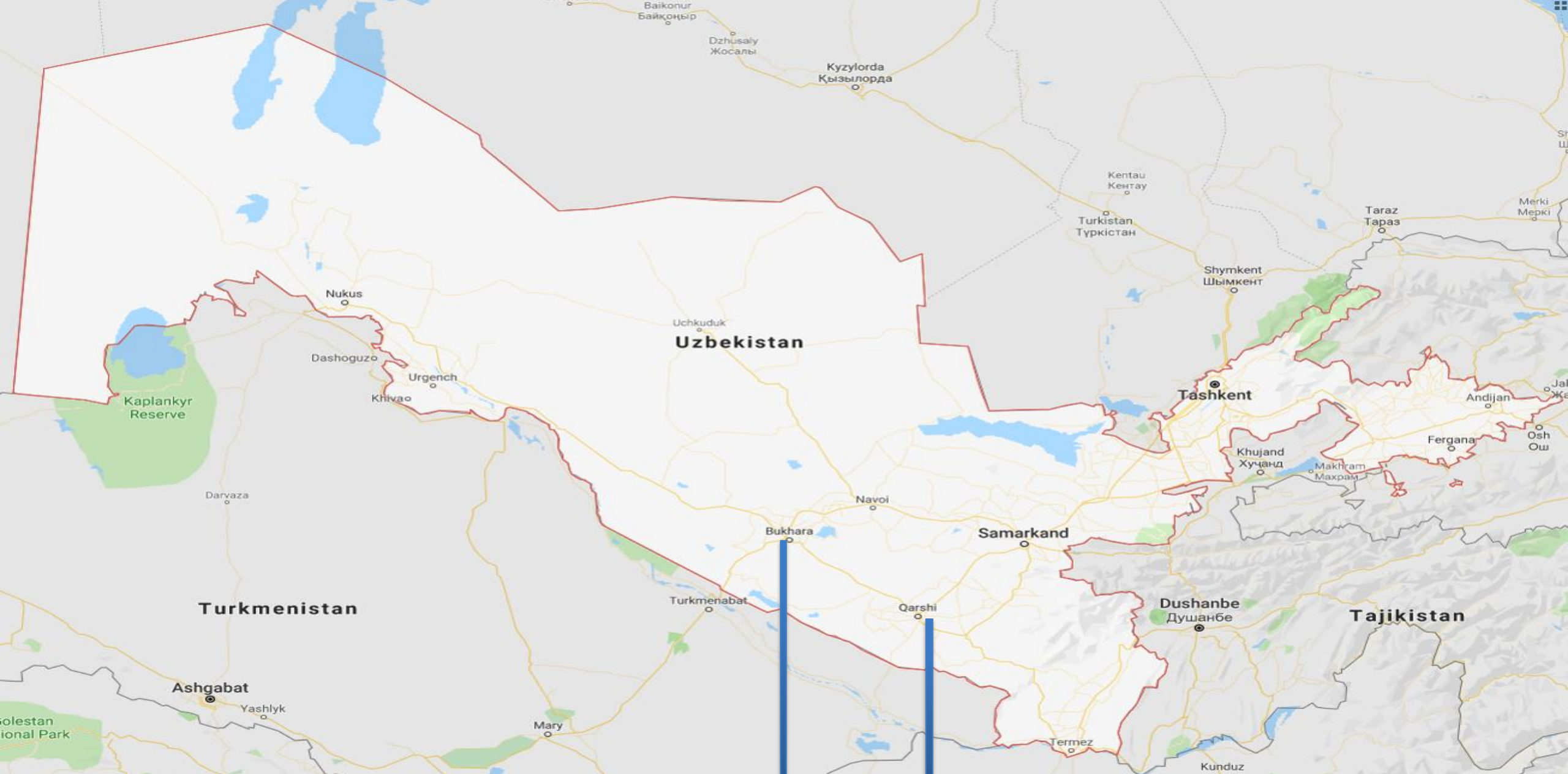


# Challenges

- Challenges of moving to no-till,
- Introduce new SLM practices,
- Adoption of new crop rotation system taking into account drought and salt tolerant crops including retention of crop residues,
- Introduce new salt tolerant halophytes and forage inclusion tailored to fit conservation agriculture cropping systems.







In Kamashi (Kashkadarya region) and Bukhara (Bukhara region) districts, demonstration sites have been established to demonstrate sustainable land management technologies, addressing drought and salinity in the

# Conservation agriculture principles



## CA impact on soil fertility and environment

Type of degradation	Conservation Agriculture impact
<b>Soil salinity</b>	<ul style="list-style-type: none"> <li>❑ Reduced soil salinity was reported by Devkota (2011b)</li> <li>❑ 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).</li> </ul>
<b>Soil organic matter</b>	<ul style="list-style-type: none"> <li>❑ 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)</li> <li>❑ 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</li> </ul>
<b>Soil Biodiversity &amp; Biological activities</b>	<ul style="list-style-type: none"> <li>❑ CA positive effect on earthworm populations, with earthworm biomasses up to 80% higher</li> </ul>
<b>Soil Physico-chemical properties</b>	<ul style="list-style-type: none"> <li>❑ CA positive effect on soil aggregation + 60% (F. Tivet, Laos 2008)</li> <li>❑ Under CA total exchange capacity + 50% (P. Lienhard, Laos 2013)</li> </ul>



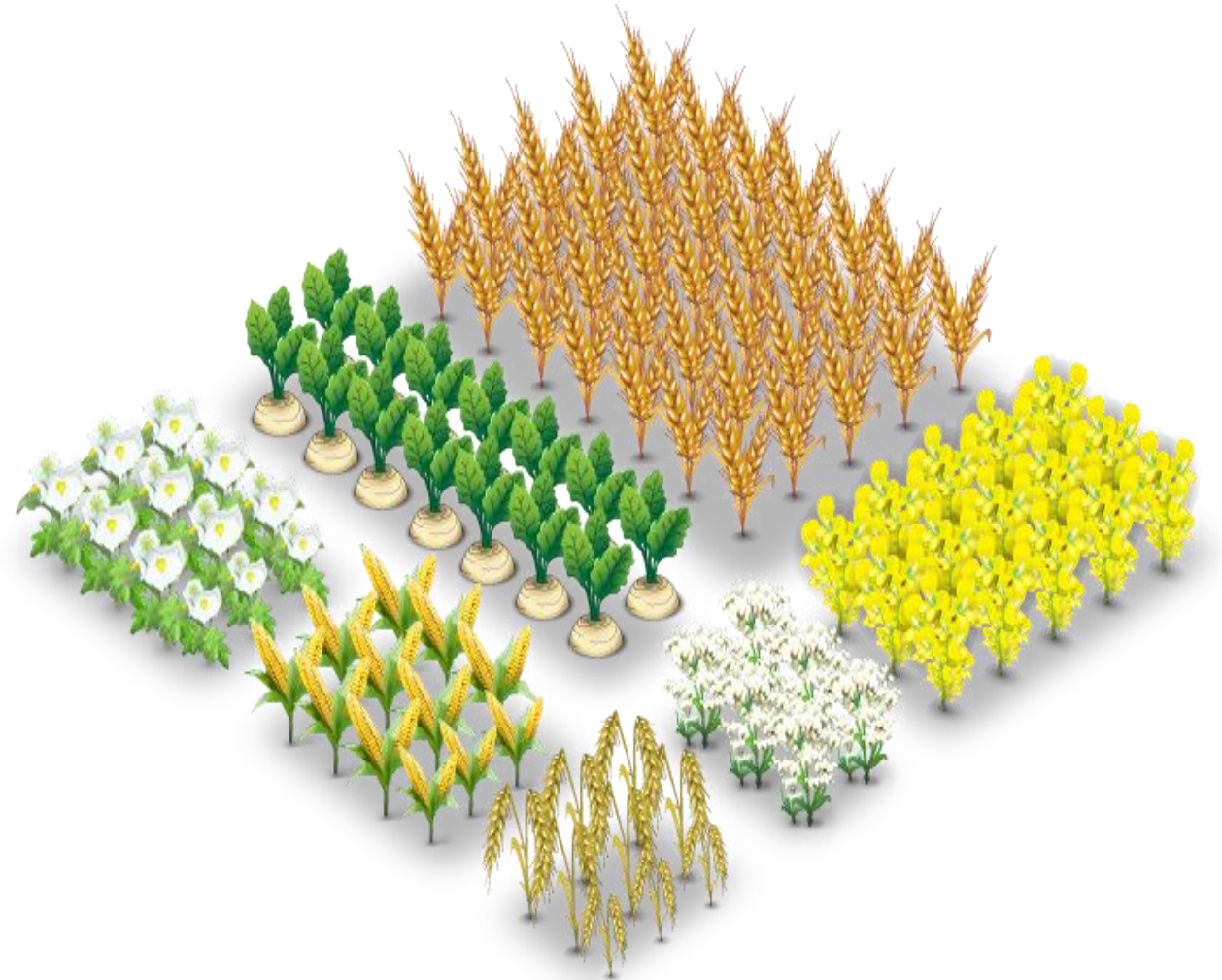
# Crop rotations diversified with crops suitable for conservation agriculture

## ***Benefits:***

- increased soil organic matter and soil structure
- controls disease, insect and reduces weed
- consistent yields
- land use efficiency increases
- profit potential

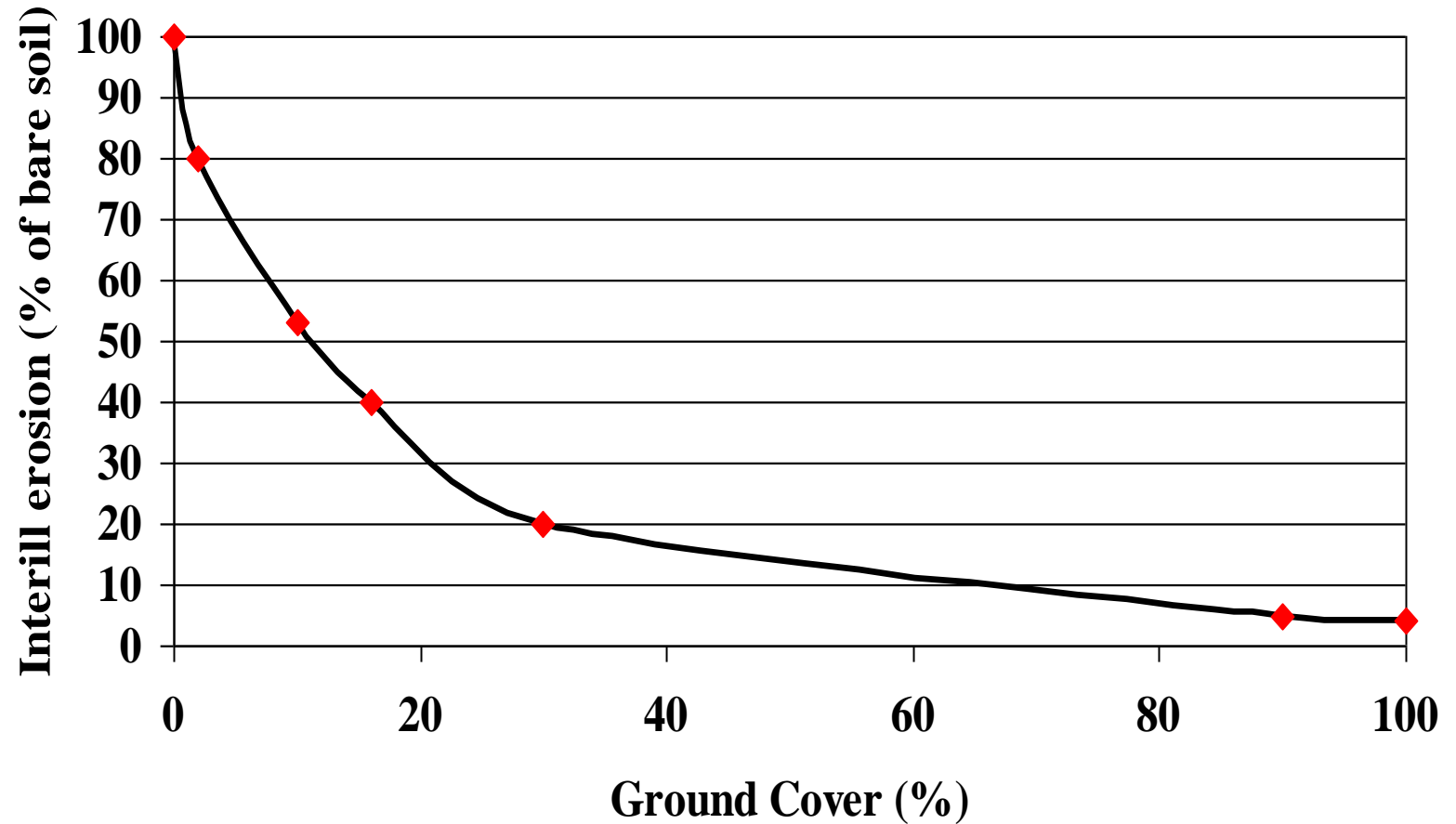
## ***Constraints:***

- farmers' ability to decide on diversified crop rotations
- lacking extension service
- seeds (introduced crops)
- mentality change



# Soil Cover and Erosion

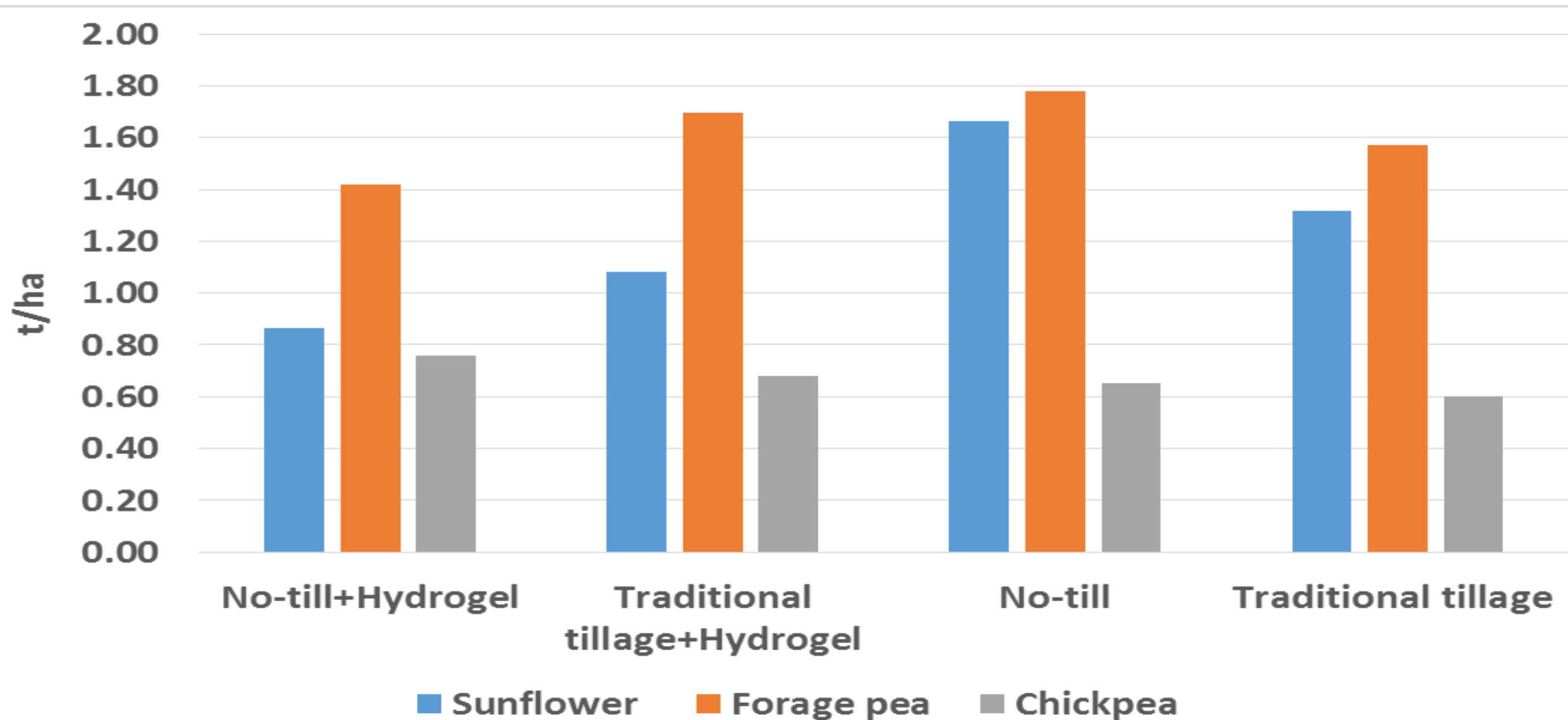
80% reduction with 30% cover!!



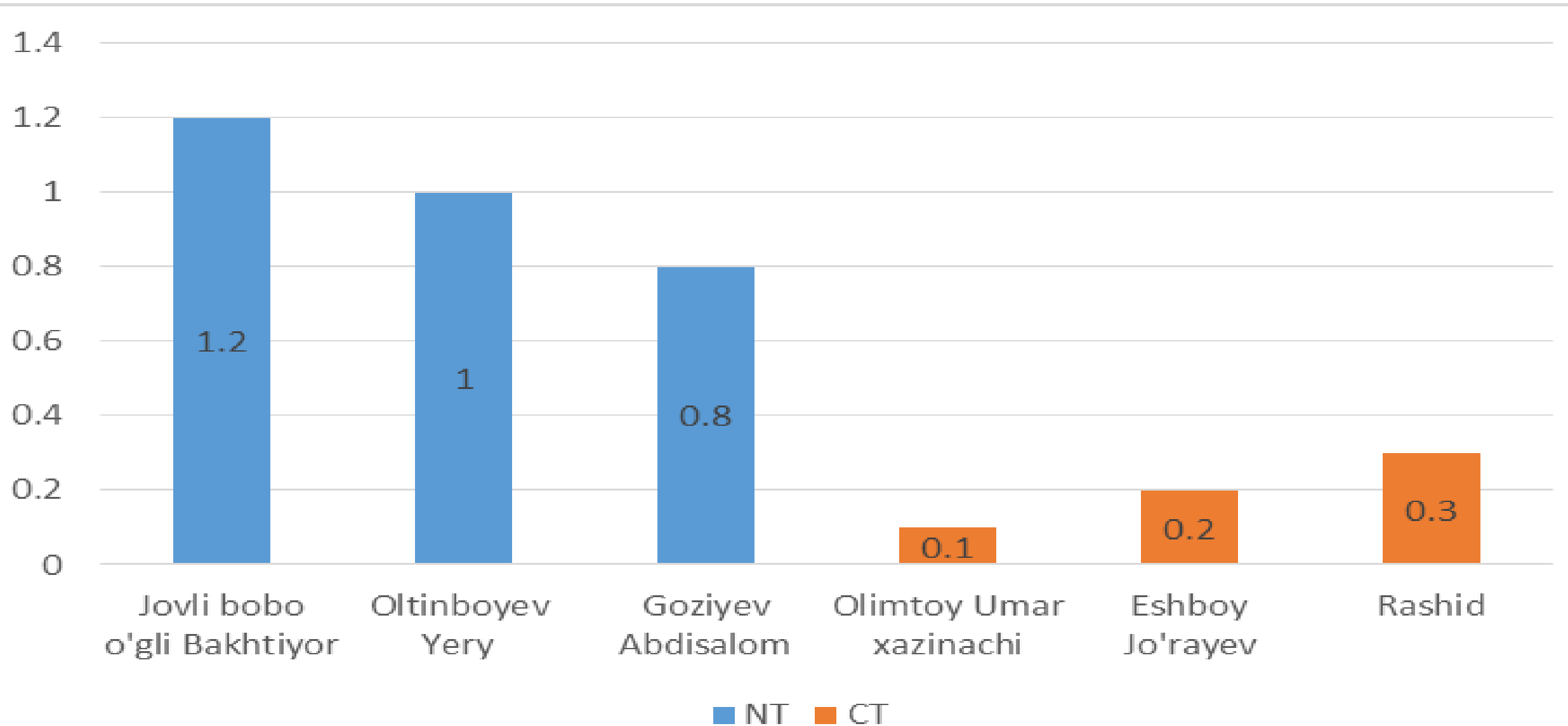
From Brady and Weil, 2002



Effect of tillage methods and hydrogel application on different crops' yield in rainfed conditions of Qashqadaryo province (2019-2021)

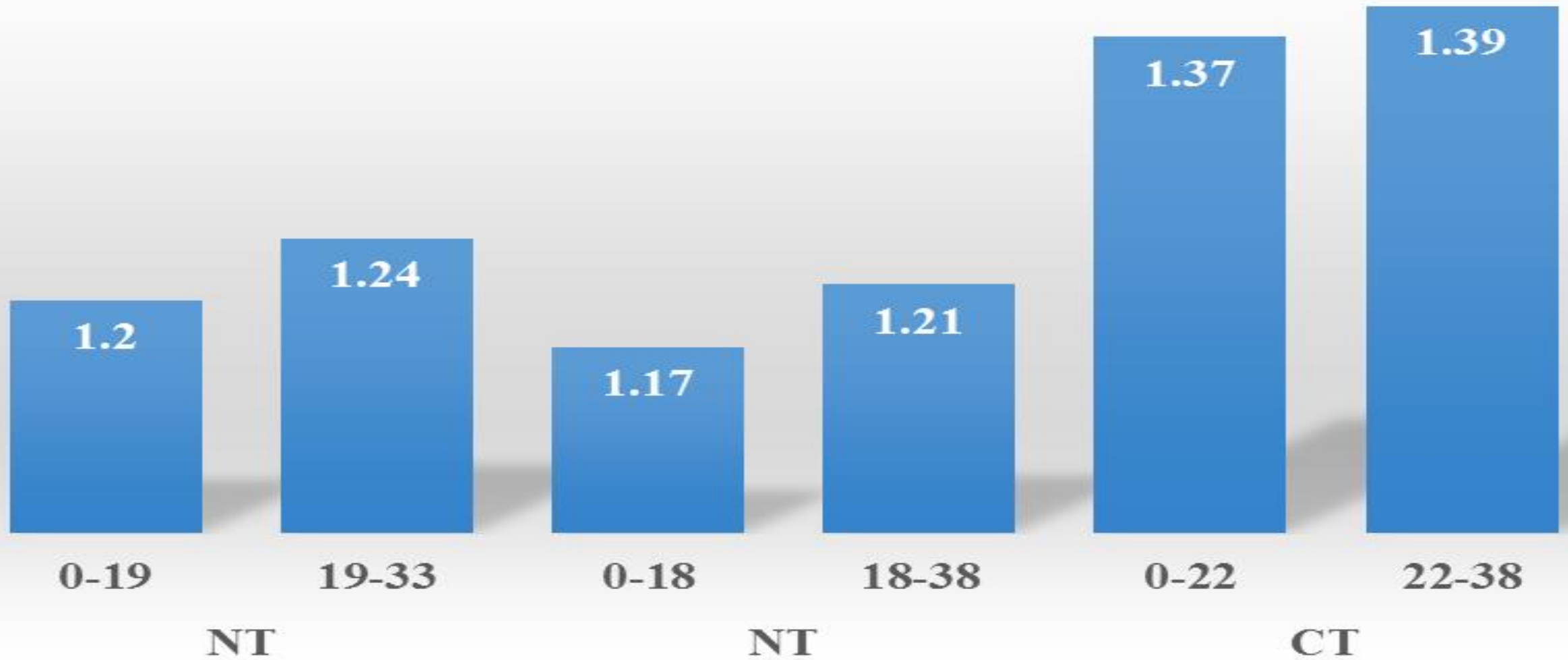


# Effect of tillage methods on winter barley yield in rainfed conditions of Qashqadaryo province (2022)





# Effect of tillage methods on soil density in rainfed conditions in Qashqadaryo province, g/cm<sup>3</sup> (2020-2022)



# Conservation agriculture and soil salinity





- Double cropped mung bean, corn and sunflower planted on 106 ha using no-till planter;



# Comparison of different agricultural practices regarding environmental problems.

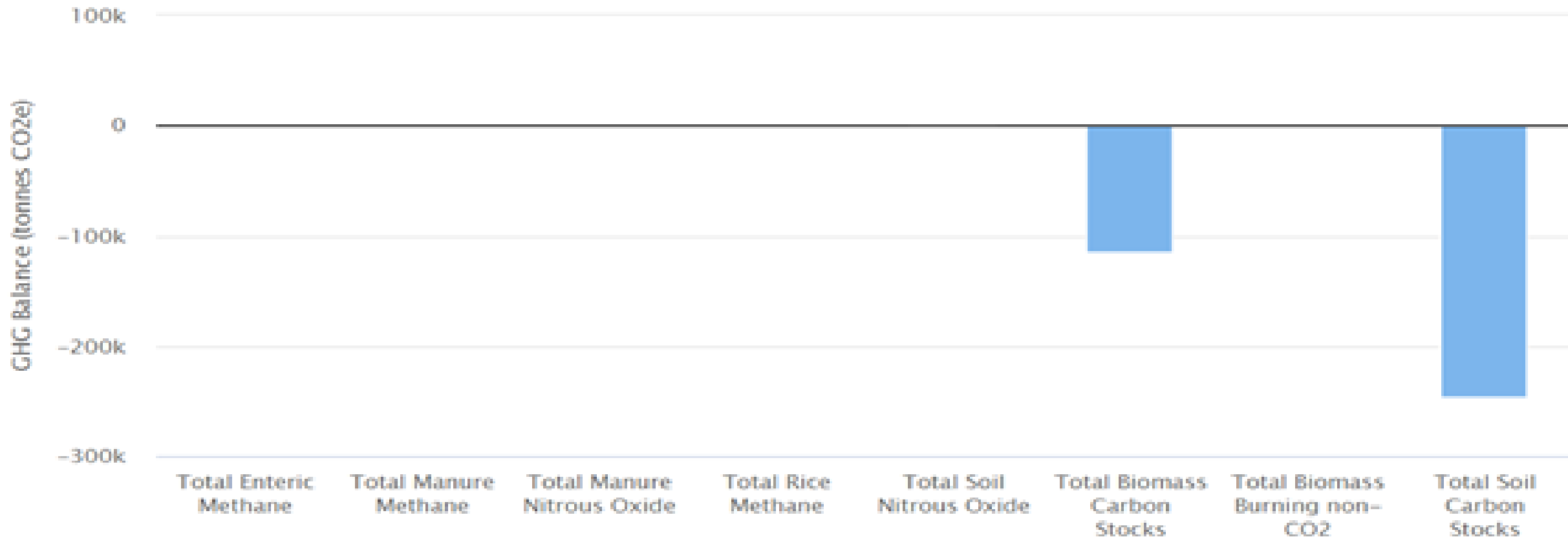
Crops	Intensity of environmental benefit regarding environmental problems							
	Soil management	Erosion	Soil organic matter	Compaction	Climate change mitigation	Biodiversity	Water quality	Safety of plant protection products application
Annual	CT*	+	+	++	-	-	+	+
	MT	+	+	++	-	++	++	++
	NT	++++	++++	++++	++++	+++	++++	++++
	NT+GC	+++++	+++++	+++++	+++++	+++++	+++++	+++++
Permanent	GC 30%	++	++	++	++	++	++	+++
	GC 60%	+++	+++	+++	+++	+++	+++	++++
	GC 90%	+++++	++++	+++++	+++++	+++++	+++++	+++++

Source: Gonzalez-Sanchez et al. (2015). \* Abbreviations: CT: Conventional tillage; GC: Groundcovers; NT: NT; MT: minimum tillage. GC 30%: Groundcovers present in 30% of the surface between the rows of trees; GC 60%: idem 60%; GC 90%: idem 90%. Effect on the environment: + slightly positive; ++++++ very positive; - negative or indifferent



# Greenhouse Gas Balance

Project: CACILM2 Uzbekistan  
Project minus Baseline Scenarios  
Net Project GHG Balance: -358917.768 tonnes CO<sub>2</sub>e



Positive values are a net increase in emissions to the atmosphere and negative values are a net reduction in emissions.

Highcharts.com

The benefit is seen in the increase in soil and biomass carbon stocks. The forestland added by the project has the largest benefit as it is adding new trees rather than replacing exiting ones

# CONCLUSIONS



Preserves soil



Enriches soil



Prevents formation of soil crust



Improves plants growth



Higher profits



Less fuel consumption



Higher yields



Less cost



**Katta rahmat**