Liquorice– a viable crop on saline land

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28 May 2018

Overview

- About IWMI
- Why saline agriculture in Central Asia
- Liquorice - a viable biological alternative for salinity management?

About IWMI

Mission: Provide evidence-based solutions to sustainably manage water and land resources for food security, people's livelihoods and the environment

Vision: A water-secure world

Core values: Excellence, objectivity, integrity, knowledge sharing, impact orientation, partnerships and teamwork, and respect for diversity

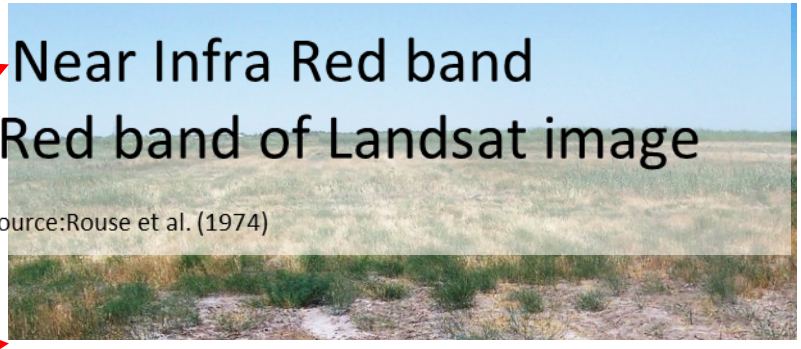
IWMI used remote sensing to map Salinity

Over 80% irrigated area in Karakalpakstan is classified as saline. Source: http://cac-program.org/files/tcp_uzb_2903_final_report.pdf

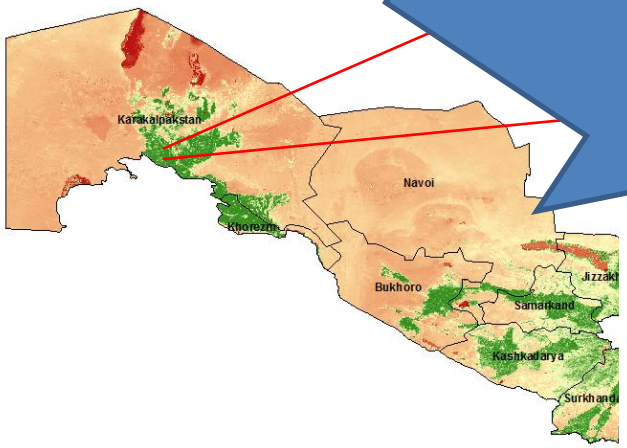
$$NDVI = \frac{NIR - R}{NIR + R}$$

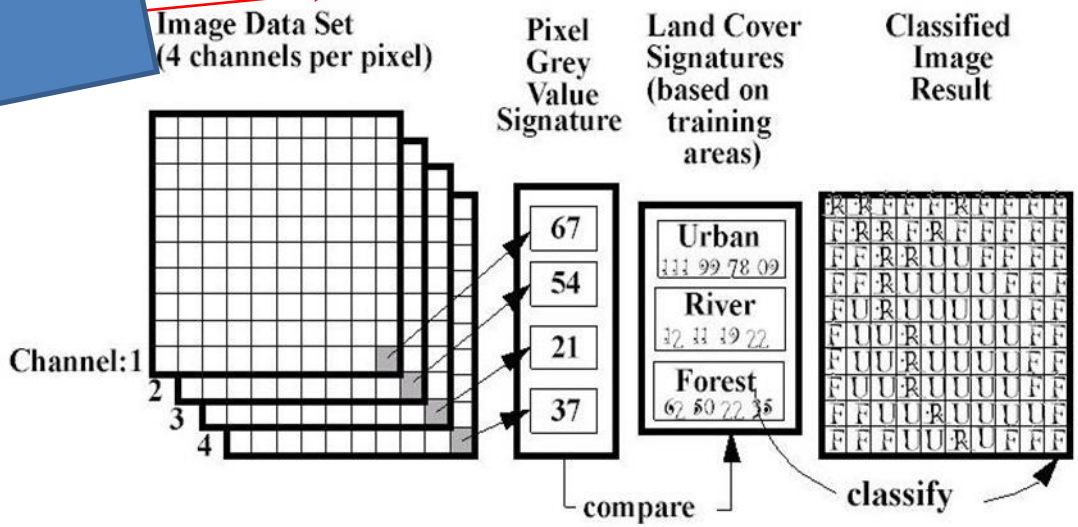
NIR – Near Infra Red band

R – Red band of Landsat image



Source:Rouse et al. (1974)





CACILM 2 - Overview of Central Asia

Country	Land Area (,000 ha)	Cultivated Area		Irrigated Area		Irri...	
		Area (,000 ha)	%	Area (,000 ha)			%
Azerbaijan	8,660	2,160	25%			636	**45**%
Kazakhstan	272,490	29,527			4%	404	34%
Kyrgyzstan	19,994	1,28...		1,023	80%	49	5%
Tajikistan	14,255			742	100%	23	3%
Turkmenistan			**4%**	**1,991**	**100%**	**1,354**	**68%**
Uzbekist...		**4,400**	**10%**	**4,198**	**95%**	**2,141**	**51%**
T...	...56	20,706	26%	5,340	26%	1,519	28%

Source: Aquastat

In 2015 IWMI estimated over 700,000 ha in Uzbekistan were salinized so that yields were significantly reduced

Why saline agriculture in CA?

- 20–25% of available surface water allocated to leaching (WEMP, 2003).
- Rehabilitation of salinized soils on Hungry Steppes estimated to require in excess of USD$ 2 billion (World Bank, 2003)
- Biological reclamation as alternative approach to remediation of salinity for the Hungry Steppes of Uzbekistan

Liquorice cultivation in Central Asia.

- Saline agriculture – Glycyrrhiza glabra (commonly referred to as liquorice) – an alternative approach to salinity management
- 4 year trial of liquorice for amelioration of soils for cotton and wheat cropping
- Trial sites on abandoned highly saline soils in Bayauut district of Syrdarya province, Uzbekistan, - on Hungry Steppes

Trial resulted in change in appearance.

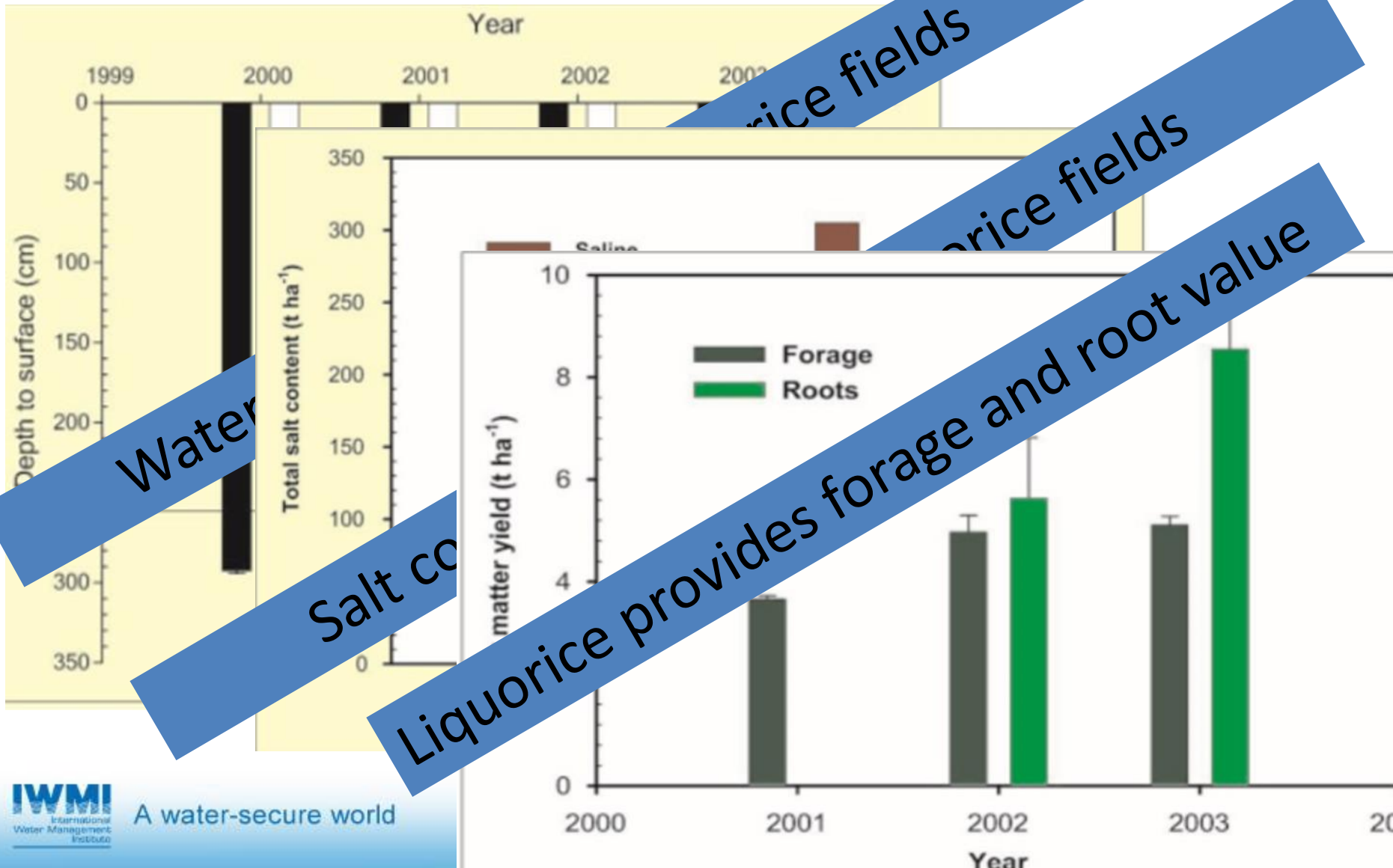
Before interventions

After introducing liquorice

Liquorice positive contribution during reclamation

- Market potential for Liquorice root is over 30,000 t/yr
- Improves:
  - soil physical characteristics (lower soil compaction, increase porosity),
  - lowers groundwater table
  - chemical characteristics (reduces concentration of soluble solids) and
  - biological properties.
- Provides animal fodder annually
- Liquorice roots for sale on **3 to 4 year cycle**

Changes in key characteristics



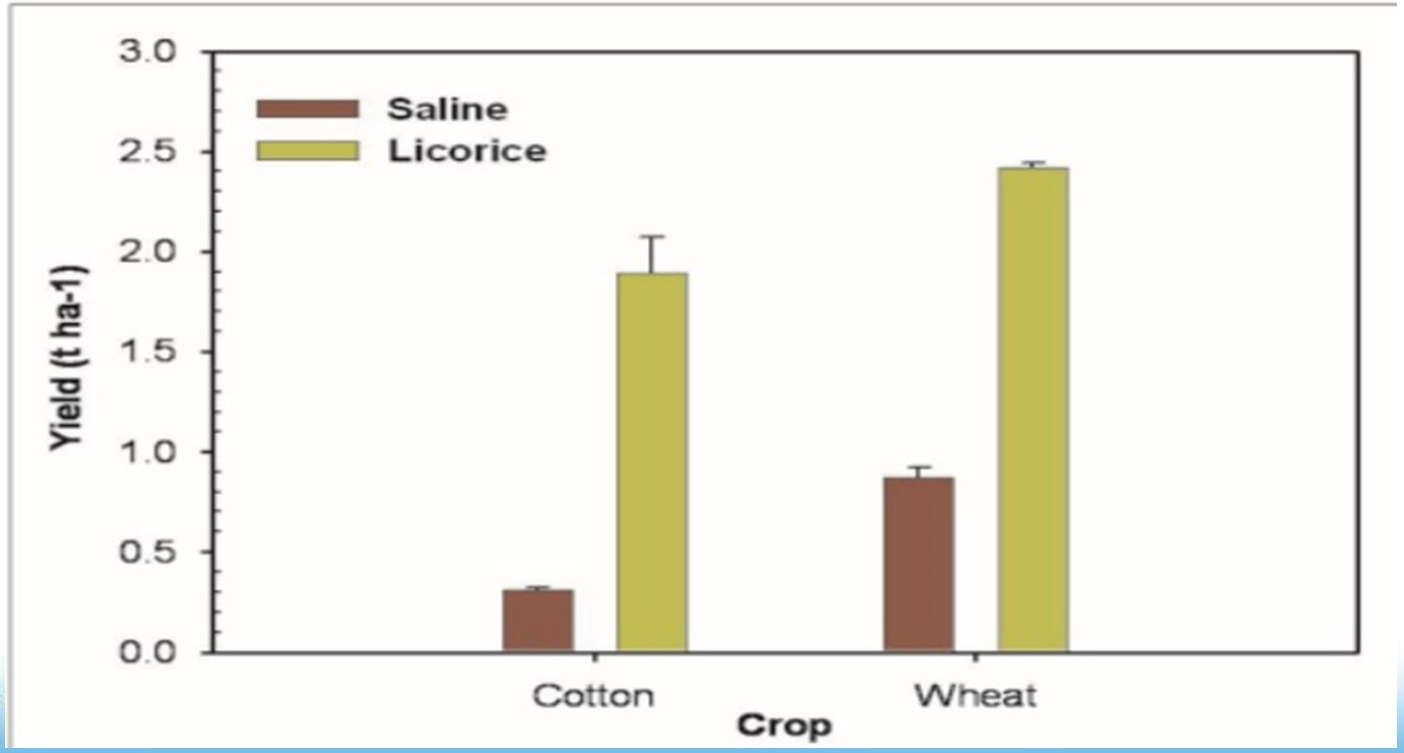
Income during reclamation

	Liquorice	Cotton	Units
Yield	15.0	1.2	t/ha
Sale Price	212.0	275.0	$/t
Total Income (4 year cycle)	3,180.0	1,320.0	$/ha
Average annual income	795.0	330.0	$/ha
Annual cultivation costs	199.0	297.0	$/ha
Net profit (USD/ha)	596.0	33.0	$/ha

Source: IWMI field trials – Karalpakstan 2000-2004

Substantial improvement after Liquorice

Crop	Control plots (t/ha)	After liquorice (t/ha)
Wheat	0.82	2.42
Cotton	0.31	1.89



Conclusions

Glycyrrhiza glabra (liquorice) cultivation:

- Viable approach to returning saline soils to production
- Expanding market for liquorice – medical, food, and chemical products
- Source of:
  - Animal fodder from abandoned land
  - income for farmers (and country as export crop) during reclamation

But:

- Finance a constraint in 3-4 year harvest cycle

Thank you

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