Watering through furrow in cotton field

Water-conservation technology at cultivation of the cotton in south. K (Kazakhstan)

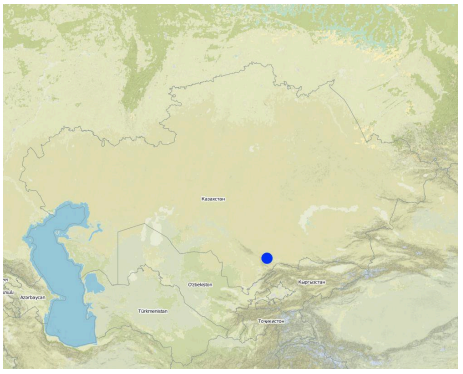
Watering through furrow

DESCRIPTION

The technology of watering through furrow reduces the settlement (recommended) sizes of irrigating norms up to 30% keeps soil fertility

It is applied for watering on furrow at ploughed cultures.
It is intended for decrease in irrigating norms and preservation of fertility of soils.
The technology of watering through furrow
-Does not result in change of zone system of agriculture
-Provides pass of soil-cultivating technique on dry furrow therefore are reduced the rates of soil condensation
-Reduces technological losses of irrigating water to filtration shed from the irrigated grounds evaporation
-Reduces the sizes of irrigating norms (recommended) up to 30%
-Reduces loading to drainage system up to 30%
-Slows down the rates of development of erosive processes and keeps soil fertility
-Raises productivity of cultivated cultures at deficiency of water
-Improves ecological conditions due to reduction of drainage shed of water for limits of irrigated files
-Does not demand additional expenses for its introduction

LOCATION



Location: Basin of Syrdarya, Southern Kazakhstan, Kazakhstan

No. of Technology sites analysed:

Geo-reference of selected sites
- 70.43, 43.1807

Spread of the Technology: evenly spread over an area (40.0 km²)

In a permanently protected area?:

Date of implementation: less than 10 years ago (recently)

Type of introduction
- ☐ through land users' innovation
- ☐ as part of a traditional system (> 50 years)
- ☑ during experiments/ research
- ☐ through projects/ external interventions

Watering through furrow in cotton field

CLASSIFICATION OF THE TECHNOLOGY

Main purpose

- [ ] improve production
- [ ] reduce, prevent, restore land degradation
- [ ] conserve ecosystem
- [ ] protect a watershed/ downstream areas – in combination with other Technologies
- [ ] preserve/ improve biodiversity
- [ ] reduce risk of disasters
- [ ] adapt to climate change/ extremes and its impacts
- [ ] mitigate climate change and its impacts
- [ ] create beneficial economic impact
- [ ] create beneficial social impact
- [x] Reduce amount of irrigation water

Land use

Land use mixed within the same land unit: Yes - Agro-pastoralism (incl. integrated crop-livestock)

Cropland

- Annual cropping: fibre crops - cotton

Number of growing seasons per year: 1

Grazing land

Water supply

- [x] rainfed
- [ ] mixed rainfed-irrigated
- [ ] full irrigation

Purpose related to land degradation

- [ ] prevent land degradation
- [x] reduce land degradation
- [x] restore/ rehabilitate severely degraded land
- [ ] adapt to land degradation
- [ ] not applicable

Degradation addressed

SLM group

- irrigation management (incl. water supply, drainage)

SLM measures

agronomic measures - A4: Subsurface treatment

structural measures - S3: Graded ditches, channels, waterways

TECHNICAL DRAWING

Technical specifications

ESTABLISHMENT AND MAINTENANCE: ACTIVITIES, INPUTS AND COSTS

Calculation of inputs and costs

- Costs are calculated:
- Currency used for cost calculation: **USD**
- Exchange rate (to USD): 1 USD = n.a
- Average wage cost of hired labour per day: 0.50

Most important factors affecting the costs

Arrangement of furrows its cutting and reinforcing of the bottom of furrow

Establishment activities

n.a.

Establishment inputs and costs

Specify input	Unit	Quantity	Costs per Unit (USD)	Total costs per input (USD)	% of costs borne by land users
Labour					
Labour	ha	1.0	650.0	650.0	
Equipment					
Machine use	ha	1.0	40.0	40.0	
Construction material					
Polyethylene film	ha	1.0	55.0	55.0	
Total costs for establishment of the Technology				**745.0**	
Total costs for establishment of the Technology in USD				*745.0*	

Maintenance activities

1. tillage (Timing/ frequency: between / weekly)
2. entering of phospho-gypsum (Timing/ frequency: watering / once a year in the autumn)

Maintenance inputs and costs

Specify input	Unit	Quantity	Costs per Unit (USD)	Total costs per input (USD)	% of costs borne by land users
Labour					
Tillage and appliyng phospho-gypsum	ha	1.0	100.0	100.0	
Construction material					
Polyethylene film	ha	1.0	25.0	25.0	
Total costs for maintenance of the Technology				**125.0**	
Total costs for maintenance of the Technology in USD				*125.0*	

NATURAL ENVIRONMENT

Average annual rainfall
- [x] < 250 mm
- [ ] 251-500 mm
- [ ] 501-750 mm
- [ ] 751-1,000 mm
- [ ] 1,001-1,500 mm
- [ ] 1,501-2,000 mm
- [ ] 2,001-3,000 mm
- [ ] 3,001-4,000 mm
- [ ] > 4,000 mm

Agro-climatic zone
- [ ] humid
- [ ] sub-humid
- [ ] semi-arid
- [x] arid

Specifications on climate

Average annual rainfall in mm: 235.0

Growing pirriod 4-5 months

Slope
- [x] flat (0-2%)
- [ ] gentle (3-5%)
- [x] moderate (6-10%)
- [ ] rolling (11-15%)
- [ ] hilly (16-30%)
- [ ] steep (31-60%)
- [ ] very steep (>60%)

Landforms
- [ ] plateau/plains
- [ ] ridges
- [ ] mountain slopes
- [ ] hill slopes
- [x] footslopes
- [x] valley floors

Altitude
- [ ] 0-100 m a.s.l.
- [x] 101-500 m a.s.l.
- [ ] 501-1,000 m a.s.l.
- [ ] 1,001-1,500 m a.s.l.
- [ ] 1,501-2,000 m a.s.l.
- [ ] 2,001-2,500 m a.s.l.
- [ ] 2,501-3,000 m a.s.l.
- [ ] 3,001-4,000 m a.s.l.
- [ ] > 4,000 m a.s.l.

Technology is applied in
- [ ] convex situations
- [ ] concave situations
- [ ] not relevant

Soil depth
- [ ] very shallow (0-20 cm)
- [x] shallow (21-50 cm)
- [ ] moderately deep (51-80 cm)
- [ ] deep (81-120 cm)
- [ ] very deep (> 120 cm)

Soil texture (topsoil)
- [ ] coarse/ light (sandy)
- [x] medium (loamy, silty)
- [x] fine/ heavy (clay)

Soil texture (> 20 cm below surface)
- [ ] coarse/ light (sandy)
- [ ] medium (loamy, silty)
- [ ] fine/ heavy (clay)

Topsoil organic matter content
- [ ] high (>3%)
- [ ] medium (1-3%)
- [ ] low (<1%)

Groundwater table
- [ ] on surface
- [ ] < 5 m
- [ ] 5-50 m
- [ ] > 50 m

Availability of surface water
- [ ] excess
- [ ] good
- [ ] medium
- [ ] poor/ none

Water quality (untreated)
- [ ] good drinking water
- [ ] poor drinking water (treatment required)
- [ ] for agricultural use only (irrigation)
- [ ] unusable

Is salinity a problem?
- [ ] Yes
- [ ] No

Occurrence of flooding
- [ ] Yes
- [ ] No

Species diversity
- [ ] high
- [ ] medium
- [ ] low

Habitat diversity
- [ ] high
- [ ] medium
- [ ] low

CHARACTERISTICS OF LAND USERS APPLYING THE TECHNOLOGY

Market orientation
- [ ] subsistence (self-supply)
- [x] mixed (subsistence/ commercial)
- [x] commercial/ market

Off-farm income
- [ ] less than 10% of all income
- [x] 10-50% of all income
- [ ] > 50% of all income

Relative level of wealth
- [ ] very poor
- [ ] poor
- [ ] average
- [ ] rich
- [ ] very rich

Level of mechanization
- [x] manual work
- [ ] animal traction
- [x] mechanized/ motorized

Sedentary or nomadic
- [ ] Sedentary
- [ ] Semi-nomadic
- [ ] Nomadic

Individuals or groups
- [ ] individual/ household
- [ ] groups/ community
- [ ] cooperative
- [ ] employee (company, government)

Gender
- [ ] women
- [ ] men

Age
- [ ] children
- [ ] youth
- [ ] middle-aged
- [ ] elderly

Area used per household
- [ ] < 0.5 ha
- [x] 0.5-1 ha
- [ ] 1-2 ha
- [ ] 2-5 ha
- [ ] 5-15 ha
- [ ] 15-50 ha
- [ ] 50-100 ha
- [ ] 100-500 ha
- [ ] 500-1,000 ha
- [ ] 1,000-10,000 ha
- [ ] > 10,000 ha

Scale
- [ ] small-scale
- [ ] medium-scale
- [ ] large-scale

Land ownership
- [ ] state
- [ ] company
- [ ] communal/ village
- [ ] group
- [ ] individual, not titled
- [x] individual, titled

Land use rights
- [ ] open access (unorganized)
- [x] communal (organized)
- [x] leased
- [ ] individual

Water use rights
- [ ] open access (unorganized)
- [ ] communal (organized)
- [ ] leased
- [ ] individual

Access to services and infrastructure

IMPACTS

Socio-economic impacts

Crop production	decreased	increased
farm income	decreased	increased
expenses on water	increased	decreased

Socio-cultural impacts

community institutions	weakened	strengthened
national institutions	weakened	strengthened
SLM/ land degradation knowledge	reduced	improved

Ecological impacts

soil moisture	decreased	increased
soil loss	increased	decreased
soil fertility	decreased	increased

Off-site impacts

downstream flooding (undesired)	increased	reduced	The area of flooding at the end of a field is reduced 3-4 times
groundwater/ river pollution	increased	reduced	Dump of drainage waters is reduced up to 2 times
norms of entering of mineral fertilizers	increased	decreased	due to decrease of washing out nutrients

COST-BENEFIT ANALYSIS

Benefits compared with establishment costs

Short-term returns	very negative	very positive
Long-term returns	very negative	very positive

Benefits compared with maintenance costs

Short-term returns	very negative	very positive
Long-term returns	very negative	very positive

CLIMATE CHANGE

-

ADOPTION AND ADAPTATION

Percentage of land users in the area who have adopted the Technology

- [ ] single cases/ experimental
- [ ] 1-10%
- [x] 11-50%
- [ ] > 50%

Of all those who have adopted the Technology, how many have done so without receiving material incentives?

- [ ] 0-10%
- [ ] 11-50%
- [ ] 51-90%
- [ ] 91-100%

Number of households and/ or area covered

850 households in an area of 40km2 (10-50 persons per km2)

Has the Technology been modified recently to adapt to changing conditions?

- [ ] Yes
- [ ] No

To which changing conditions?

- [ ] climatic change/ extremes
- [ ] changing markets
- [ ] labour availability (e.g. due to migration)

CONCLUSIONS AND LESSONS LEARNT

Strengths: land user's view

- Improves working conditions of labours and work of soil-cultivating technics
- Reduces the sizes of irrigating norms
- Raises productivity of agriculture at deficiency of wate

Strengths: compiler's or other key resource person's view

- Reduces technological losses of irrigating water to filtration, evaporations, shed from fields of on irrigation.

  How can they be sustained / enhanced? Till progressive method od an irrigation drop, rain
- Reduces intensity of soil condensation and development of denitrify processes
- Reduces loading to drainage system and rates of pollution of water sources
- Prevents degradation of the irrigated soils

Weaknesses/ disadvantages/ risks: land user's viewhow to overcome

- Increase in expenses for interrow processing Application of soil cultivating technics
- Increase in quantity of watering Reinforcing furrows by pipes

Weaknesses/ disadvantages/ risks: compiler's or other key resource person's viewhow to overcome

- Reduction of the interwatering period By increase in volume of use of subsoil waters to subirrigation
- Increase in interrow processing Regime of subsoil water management
- Increase in cost the current expenses at watering and interrow processing Increase in productivity of cultivated cultures

REFERENCES

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Full description in the WOCAT database
https://qcat.wocat.net/en/wocat/technologies/view/technologies_1091/

Linked SLM data
Approaches: Watering through furrow https://qcat.wocat.net/en/wocat/approaches/view/approaches_2364/

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Project
- n.a.

Key references

- Reports: Technology of an irrigation on the farm site in zone of Arys-Turkestan channal. 2000-2002 year.: SPC for Water management
- Recommendations on stabilization of agriculture in a zone of Arys-Turkestan channal: