

		provided
1	Ministry for land Reclamation and Water Management	100 %
2		%
3		%

G Summary of research project (see instruction on page 1)

1 Objective and technical fields:

Study of possibility to use saline drainage water for irrigation in different soil-reclamation conditions.

Objectives: Development of recommendations on saline water use for irrigation in SyrDarya middle reaches.

2 Scientific and technical approach:

Scientific ground of possibility to apply drainage water for irrigation for efficient water resources use and soil productivity improvement on large irrigation scheme in Golodnaya Steppe.

3 Environment characteristics:

Climate is sharply continental. Average annual air temperature is 14,4-15 °C. Frost-free period is 280 days. Wind velocity is up to 6 m/sec. Average air temperature during growing season (April-September) is 23-24 °C. Evaporativity during growing period is 1200-1300 mm, average annual meaning is 1500-1700 mm.

Humidity deficit is 1100-1200 and 1200-1400 mm. Precipitation is 300 mm. Relative air humidity is 50-65 %, in summer it decreases down to 27-30 %.

Geomorphology: proluvial plain made of modern sediments: alternating loam and sandy loam.

Groundwater is strongly saline.

Soils: Light grey; mechanical composition indicates on light and middle loam. Soil salinization is slight from the surface, middle within 60-100 cm layer and strong within 80-140 layer with high content of gypsum.

4 Parameters of Pilot Projects and Technical Solutions:

Two pilot sites by area in state farm 16 and 10 lots by size 5x5 m in state farm 1 were located. The first site was irrigated during 5 years from collector Akbulak, the second site - from flume 16-V-33. Cultivated crop was cotton.

On 5 lots lucerne was cultivated, on 5 others-cotton was grown.

Each two lots were irrigated by saline water from collector 1-K-3 and fresh water from flume 1-V11

5 Methodology:

Field investigation on 3 directions:

- observations over actually performed irrigation by fresh and saline water;
- field tests within small lots for assessment of waters of different composition impact on soils;
- Laboratorial investigations for the same purpose.

Testing lots were equipped by all necessary measuring and accounting devices.

Observations were performed through sampling in 10 points for determination of soil solution salinity, exchangeable cations composition, volume of absorption before and after growing season.

Chemical, physical-mechanical and hydro-physical properties of soils were determined. Phenological observations were executed.

6 Results:

During observation period (spring 1977-1979) on testing site in state farm 16 which was irrigated

by saline water with salinity 5 g/l and high content of sodium (50,7 %) significant replacement of calcium and magnesium by sodium occurred: Ca-ion content decreased down from 1,07-1,65 to 0,82-1,06 mg.ekv/100 g of soil. On site which was irrigated by fresh water no changes happened. More information about soil properties changes and saline water Influence on crop yield can be obtained from tests performed on small lots.

In irrigation water magnesium chloride prevailed. Water was assessed as a dangerous (SAR, sodium content , Mg/Ca+Mg ratio, etc). Soil properties changes can be traced according to soil solution changes: growth of SO₄, Mg and Na-ions content. While magnesium and sodium chloride prevail in irrigation water, in soil solution calcium sulphate prevails. Irrigation water salinity Influenced cotton yield only on the third year.

Water high electric conductivity (3,5-6,2 mom/cm or 2,7-5,3 g/l) application led to yield reduction on heavy loam (18-28 %) on middle loam (16-25 %), on sandy loam (14-21 %).

At the same time applying water with electric conductivity 2,6 mom/cm or 1,7 g/l shortens period of ripening compare to control.

The main conclusions are the following:

1. Investigations in state farm 16 proved the danger of saline water with high sodium content application during long time (more than 4-5 years) because of soil properties deterioration.
2. Tests on the lots of state farm 1 proved soil properties deterioration under saline water use (more than 2,5 ha), but this deterioration is observed only on 3rd year.
3. Laboratorial tests allowed to determine calculated parameters of exchange processes for main types of land related to different water chemical composition.
4. Expected economic effectiveness is 350 rouble/ha.
5. Results obtained can be used in design decisions on irrigation by saline water.

H	Suggested key-words		
1	Saline water	4	exchange volume
2	soil solution	5	
3	specific electric conductivity	6	

I	Most recent publications (maximum 3)			
1	Author(s): F. Serebrennikov, A. Morozov			
	Title: Saline drainage water use for irrigation .			
	Publication details: Determination of scope of in-contour use of drainage water for irrigation within irrigation systems of SyrDarya basin with regard to local and regional restrictions; ground of possibility of approved water requirements norms use. Recommendations on saline water use and value of norm change coefficient K _o with regard to irrigation water salinity.			
	Year of publication: 1987	free access	<input checked="" type="checkbox"/> restricted	<input type="checkbox"/> confidential
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	Year of publication:	free access	<input checked="" type="checkbox"/> restricted	<input type="checkbox"/> confidential
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	Title:			

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