



<b>G</b>	<b>Summary of research project (see instruction on page 1)</b>
<p><b>1 Objective and technical fields:</b> Irrigated lands salinization prevention is based on soil artificial drainability strengthening by tile horizontal drainage (THD) construction. Objective: Development of set of measures on prevention of soil secondary salinization on base of leaching regime of irrigation, land drainability increase, drainage workability assessment, selection of most effective type of drainage.</p>	
<p><b>2 Scientific and technical approach:</b> Soil secondary salinization prevention, soil and water productivity increase based on soil water-salt regime management. Meaning: Scientific ground of the set of measures on soil water-salt regime improvement based on tile horizontal drainage construction.</p>	
<p><b>3 Environment characteristics:</b> Climate is sharply continental. Air temperature within January-February is <math>-28^{\circ}\text{C}</math>, within July-August <math>44^{\circ}\text{C}</math>. Geomorphology: Ancient alluvial slightly corrugated plain. Altitude of surface is 97-99 m with slope 0.0002-0.0004 to north-west. Lithology: Quaternary sediments: cover layer - sandy loam depositions with permeability coefficient 0.3-0.6 m/day. Soils: Volume mass is 1.18-1.65 g/cu.cm; density is 2.65-2.66 g/cu.cm; porosity is 43.6-50 %; weighted moisture is 13.2-35.1 %; limit - field water capacity is 29.5-37.1 %. Soils are differently salinized: 0.20-5.2 % on solid residual; 0.02-0.78 % on chlorine-ion; 0.104-2.47 % on sulphate-ion. Salinization type is from sulphate to chloride-sulphate. Groundwater level initially under open collector network was 0.5-1.0 m; within vegetation it achieved land surface provoking water-logging. Initial water salinity was 4.6-15.3 g/l.</p>	
<p><b>4 Parameters of Pilot Projects and Technical Solutions:</b> Site's area is 214 ha (gross). Within site area 30 drains of total extent 15 km were constructed. The following design of screen was used: a) corrugated plastic tubes <math>D=125</math> (200) mm with 1 layer non-woven filtering material; b) corrugated plastic tubes with sand-gravel filling; c) ceramic tubes with combination of screens, glass-wedding and sand filling; d) reinforced concrete construction with crushed stone filling. Drains length is 220 (530) m, gradient is 0.0008-0.0014, depth is 1.3-1.6 m, distance between drains is 40 (80) m. Irrigation network is represented by earthen canals and flumes with efficiency 0.86. Leaching rate is 2500-6500 cu.m/ha depending on soil salinization. Main crop is cotton. Irrigation norm is 4.5-5.5 th.cu.m/ha (net). Cotton yield did not exceed 1.8-2.2 t/ha before THD construction and 2.6-3.0 t/ha after it construction.</p>	
<p><b>5 Methodology:</b> Field investigation of water and salt movement within unsaturated zone, groundwater and irrigated area as a whole. Pilot site was equipped by means of water accounting for regular observations. Multicriterial analysis was used to process data obtained.</p>	
<p><b>6 Results:</b> The following parameters of soil water-salt regime were studied. Drainage modulus and outflow annual and long-term changes. Drains' discharge changed from 0.6-1.0 to 7.0-7.5 l/sec depending on drain's design; specific yield was 1-2 l/sec/ha (corrugated plastic tubes with sand-gravel filling); 0.4-0.8 l/sec/ha (the same without filling); 0.1-1.0 l/sec/ha (ceramic tubes) and 0.01-0.1 l/sec/ha (reinforced concrete tubes). Drainage outflow under THD influence increased substantially up to 1178 cu.m/ha, during leaching - 660 cu.m/ha. Specific drainability was 21.94 cu.m/day/ha (under leaching) and 31.78 cu.m/day/ha (during vegetation). Groundwater level was regulated within 1.0-2.0 m (in spring and growing period). Since September groundwater level decreases and achieves 2.5-3.0 m in November-December. Groundwater depletion rate was 15-20 cm/day within drained fields and 2-5 cm/day within slightly</p>	

drained ones.

Groundwater salinity after leaching on drained lands decreased from 2-12 to 1-2 g/l with further increase to 2.5-4.5 g/l.

Within period of observation area of middle and strongly salinized lands was reduced on 17-25 % and area of slightly and non-salinized land increased 2.5-3.5 times under desalination coefficient 1.38-1.88 (1997), 1.33-1.88 (1988), 1.36-2.58 (1989).

Analysis of root layer moisture dynamics shows that under drainage operation it decreases after 12-15 days to 70 %, after 30 days (without irrigation) to 35-40 %. Irrigation norm within growing season was changing from 3.8 to 4.5 th.cu.m/ha and watering depth - from 2.8 to 4.5 th.cu.m/ha under total evaporation 8.5-9 th.cu.m/ha per year.

Water-salt balance of unsaturated zone was negative. Salt removal was 8.6-13.5 t/ha under initial salt stock 149.3 t/ha; within the period of observation 35 t/ha salt were removed.

Results of investigations show that shallow tile drainage from polyethilen tubes D=125 mm with wedding and sand filling is very efficient under conditions of multi-layer floating soils.

THD from ceramic and reinforced concrete tubes with crushed stone filling did not provide designed parameters.

Economic efficiency was 29 rouble/ha.

H Suggested key-words			
1	Horizontal drainage	4	Soil salinization
2	Water-salt balance	5	Groundwater regime
3	Leaching regime	6	Groundwater salinity

I Most recent publications (maximum 3)			
1	<i>Author(s):</i> V.Dukhovny, T.Djalilova, O.Eschanov		
	<i>Title:</i> Certain directions of land reclamation improvement in Horezm oasis		
	<i>Publication details:</i>		
	Year of publication:	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/>