

REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE**QUESTIONNAIRE**

A	Project title:	Study of reclamation processes in State farm N 6 "Titov"
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B	Topic n° : 2	Sub-topic n°: 02
1)	1	Technical field n°: 23
	category 02	

C	Project location: SyrDarya province, Sh. Rashidov district, state farm N 6 "Titov"	
	Country: Republic of Uzbekistan	Area: 11912 ha
	Precise details if possible	
	Country(ies):	Locality(ies):
	City(ies):	Others(s):

D	Duration of the project:		
	Year in which the project was started: 1964	Project completed: 1973	
		Expected completion date: 1966, 1969, 1970, 1973	

E	Organizations and technical staff involved		
1	Supervisor/project coordinator (SURNAME, First name): Baturin Gennadiy		60 %
	Organization: SANIIRI		Staff resources
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	Other counterparts:	Organizations	2)
	First name	Surname	
	(full name or acronym)		
1	TIIMSH, Rachinskiy Alexander		40 %
2			%
3			%
4			%
	Other collaborators:	man-	
	years		

F	Funding agencies	
	Full name or acronym	Percentage of

		project finance provided
1	Ministry for Land Reclamation and Water Management	100 %
2		%
3		%

G	Summary of research project (see instruction on page 1)
	<p><i>1 Objective and technical fields:</i> Prevention of soil salinization on new developed lands on basis of land artificial drainability creation (by close horizontal drainage), leaching regime of irrigation. Drainage design, reclamation efficiency, drainage workability definition.</p>
	<p><i>2 Scientific and technical approach:</i> Prevention of soil salinization based on soil water-salt regime regulation by systematic close horizontal drainage, leaching regime of irrigation, etc. Meaning: Development of set of recommendation on close horizontal drainage workability improvement, irrigated lands productivity increase, water saving.</p>
	<p><i>3 Environment characteristics:</i> Climate is continental. Average temperature is 14-15 C, maximum is 42-47 C (June-July), minimum - 14-24 °C, ((January-February). Growing period duration is 200-230 days with the sum of active temperatures 4000-5000 °C. Annual precipitation is 260-230 mm, including 70-80 % within winter-spring time. Relative air humidity is 70-80 %, in summer - 25-30 %; average is 51-64 %. Total evaporativity is 1000-1200 mm. Wind velocity achieves 40 m/sec, direction is north-west and south-east. Relief is slightly corrugated with slope 0,002-0,006 to north-west. Geomorphology: highly elevated zone and flat proluvial plain. Before land development (1961) groundwater level was 3-5 and 10-25 m. Water salinity was 20-50 g/l (south) and 20-30 g/l (central and northern parts), sulphate-chloride-sodium. Lithology: quaternary loamy sediments with cleavage (100-200 m) from sandy loam to clay. Permeability coefficient is 0,01 (clay), 1,0 (sandy loam), 2-3 m/day. (sand). Soils are represented by sandy loam, light and middle loam with gypsum interlayers. Volume mass is 1,3-1,38 g/ cu. cm, porosity is 46-48 %. Specific features of loess loam are high water-lifting ability (2,5-3 m), low water capacity (2-4 % under moisture content 40-50 % and subsidence. Before development 1 m-layer was non-salinized (0,36-0,9 %) on solid residue and 0,007-0,009 % on chlorine-ion, chloride-sulphate. About 1800 ha of lands were strongly salinized,</p>
	<p><i>4 Parameters of Pilot Projects and Technical Solutions:</i> Field investigation of groundwater level and salinity dynamics, soil salt content, unsaturated zone water-salt balance, close horizontal drainage technical state and workability. Experimental sites were singled out with area of 18-200 ha. They were equipped by means of observation and management -gauging stations, observation wells, piezometers. Piezometer screen depth was 4,6-7, 10-12, 16 and 20 m depending on lithology with interval between them 5-10 cm. For lithology precising 80 wells were drilled. Multicriterial analysis was used to data processing.</p>
	<p><i>5 Methodology:</i> Pilot site's area is 11912 ha from which 10680 ha are cultivated. Its length is 18-20 km, width - 7-10 km. Water supply is performed from South-Golonostepskiy canal with total water intake 10-14 cu. m/sec. Irrigation network is represented by concrete flumes with efficiency 0,92-0,96. Collectors' extent is 112 km, depth is 3,5-7,0 m. Close horizontal drainage construction was</p>

executed within 8 years and by 1972 its extent was 824 km. Drain depth is 2,5-4,0 m. Main crop is cotton.

6 Results:

State farm N 6 "Titov" was one the first new farms in Golodnaya Steppe. It was expected that collector-drainage network with specific extent of 15-20 m/ha will be sufficient. Unfortunately irrigation under low drainability led to groundwater level raise, soil salinization and land productivity reduction. Secondary salinization was fixed on 50-55 % of the area (saline groundwater level was less than 3 m) and strongly salinized lands occupied 15 % of the area. All this was a reason for drainage application study. As result of this study was found:

- accepted preliminary permeability coefficient was 2-3 times higher (0,7-1,0 instead of 0,2-0,6 m/day);

- availability on depth of 20-25 (south), 15-20 (center), 8-15 m (north) of clay stratum (permeability coefficient less than 0,01m/day) with thickness of 3-12 m.

- filtration water impact (300-500 cu. m/ha per month) on groundwater over the stripe of 600-800 m width;

- close drains impact distance is 45-50 m (south), 65-80 (center), 9-110 (north), which provides sustainable soil desalinization. Infiltration was 0,1-0,3 l/sec/ha within vegetation and 0,5-0,8 l/sec/ha within leaching: these figures are close to drainage modulus value i. e. It is formed mainly at expense of surface water filtration;

- head gradients within the border zone between soil and drain screen were 2-7.

Results of investigation permitted:

- to correct specific extent of collector-drainage network: 100-105 m/ha (south), 70-80 m/ha (center), 40-45 m/ha (north). Average for farm is 75 m/ha, including collectors - 9,8 m/ha;

- to ground screen design and select filling gravel fractions: $D_{10} \geq 0,1$ mm; $D_{50} = 0,8-20$ mm; $D_{100} = 10-20$ mm; irregularity coefficient - 12-20;

Analysis of reclamation process dynamics showed, that, two periods of its development could be traced:

1) 1961-1966. Intensive saline (20-50 g/l) groundwater stock accumulation. Its level was 1-2 m (2650 ha), 2-3 m (480 ha), 3-5 m (4273 ha), 5-10 m (185 ha).

As a consequence 2650 ha were strongly salinized and 4675 ha were middle salinized.

2) 1967-1972. Collector-drainage network extension from 35,8 to 73,0 m/ha created conditions for downward water movement and together with other measures (leaching land leveling) increased land fertility.

- groundwater level was decreased. In 1972 level depth was 2,5-3,0 m within vegetation (85-90 % of the area);

- groundwater salinity was reduced. If in 1966 strongly saline water occupied 72 % area, in 1972 it was 2 times lower; 5-10 g/l (48,4 %) and 5 g/l (6 %);

In 1966 1-m layer was salinized by chlorine-ion as 0,4270 %; 100-200 cm-0,273 %; 0-300 cm-0,36 %;

in 1972 chlorine-ion content was respectively: 0,032; 0,031; 0,034 %. If in 1966 strongly and middle salinized soils occupied 52 % of the area, in 1972 they occupied only 2,46 %;

- biggest changes occurred in 3 m-layer: salt content was in 1960-500,5; 1965-815,0; 1972-493 t/ha; chlorine-ion: 43,7; 151,1; 14 th/ha respectively; sulphate: 193,2; 349,8; 330,1 th/ha respectively. In central and northern parts of the farm they were: 244,0; 295,0; 314,7; 16,4; 17,6; 19,0 and 158,9; 168,0; 188 t/ha respectively;

- analysis of water-salt balance showed that within 1964-1967 it was positive: groundwater raise was 0,4-1,6 m and salt accumulation was 2,0-6,8 t/ha per year. Since 1968 balance became negative: groundwater level depletion was 0,12-0,18 m and salt stock reduction was 18,2-42,0 t/ha. Total salt removal was 101,9 t/ha;

- close horizontal drainage positively influenced on water use: water release from the field was not available, irrigation norms were reduced on 2-3 th. cu m/ha (6,0-7,6 th. cu. m/ha (net) in 1968-1971 cotton yield was: 1,81 (1961-1966); 2,68 t/ha (1972).

Developed recommendation on drain construction and maintenance allowed to increase its efficiency and workability.

Close horizontal drainage construction permitted to develop within 1967-1972 3,5 th. ha of

secondary salinized lands, to increase cotton yield on 0,8-1,0 t/ha and achieve 2,5-3,2 t/ha. Economic efficiency was 120 rouble/ha.

H Suggested key-words			
1	Soil secondary salinization	4	drainage effluent
2	leaching regime of irrigation	5	close horizontal drainage
3	groundwater level	6	soil desalinization

I Most recent publications (maximum 3)			
1	Author(s): A.Rachinskiy, V.Lazaridis, G. Baturin		
	Title: Experience of soil reclamation process study within new developed zone of Golodnaya Steppe.		
	Publication details: Investigation results within new developed lands of Golodnaya Steppe are considered.		
	Year of publication: 1969	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/> confidential <input type="checkbox"/>
2	Author(s): Kh. Yakubov, G.Yeremenko, G. Baturin, V. Lazaridis, M. Mereshinskiy		
	Title: Calculation of economic efficiency of close horizontal drainage construction.		
	Publication details: Observation on reclamation state of land dynamics are shown. Soil and groundwater desalinization processes analysis is performed.		
	Year of publication: 1971	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/> confidential <input type="checkbox"/>
3	Author(s):		
	Title:		
	Publication details:		
	Year of publication:	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/> confidential <input type="checkbox"/>