

REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

A	Project title: Vertical Drainage System (VDS) technical -economic efficiency study under the Golodnaya Steppe conditions.
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B	Topic n° : 1	Sub-topic n°: 2
1)		Technical field n°: 3
2)	Category n°: 01	

C	Project location	
	Country: Republic of Uzbekistan	Area: 3000 ha
	Syrdarya province, collective farm "50 years of Uzbekistan"	

D	Duration of the project:	
	Year in which the project was started: 1965	Project completed: 1986
		Dates of Expertise: 1986

E	Organizations and technical staff involved				
1	Supervisor/project coordinator: Reshetkina Natalia	%			
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	Other counterparts:	Organizations	Surname	First name	
1					%
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
<p>1 Objective and technical fields: Optimal conditions of drainability creation . Objective: management by soil water-salt regime and ecologic-reclamation processes for water -land resources productivity increase on background of vertical drainage.</p>	
<p>2 Scientific and technical approaches: Prevention of soil salinization based on territory's drainability increase and salt removal from soil by groundwater pumping. Study meaning: development of the set of measures on ecologic-reclamation processes management at expense of water saving and land productivity increase.</p>	
<p>3. Environment characteristics: Climate: continental. Average annual temperature is 12.5 -13 ° C. Precipitation is 250 -350 mm., evaporativity -1120 - 1280 mm. Relative air humidity is 50 -60 %, in summer - 25 -30 %. Lithology: loess loam (18 25 m), fine- grained sand (35 50 m) and gravel- pebble (70 m). Aquifer thickness is 50 -100 m. Loam permeability coefficient is 0.07 -0.1 m/day; for aquifer - 40 -45 m/day. Groundwater level was 1 -2 m and water salinity was 15 -25 g/l, chloride - sulphate. Soils: grey-medow, middle and heavy loam, with different level of salinization. Main salt mass is located within 3 m -layer with solid residue 1.5 -3 % and chlorine 0.2 0.4 %. Loam conductivity is 1.5 -2.0 sq.m/day, aquifer - 2000 sq. m/day. Groundwater inflow is 1.5 1.8 th.cu.m/ha.</p>	
<p>4. Parameters of Pilot Projects and Technical Solutions: Irrigated area is 3000 ha. In-farm irrigation network is earthen with efficiency 0.65 -0.75. Collector -drainage network density is 25 -45 m/ha under drains depth 1.5 -3.5 m. There are 28 wells of vertical drainage by depth 65 -80 m. Screen diameter is 429 mm, its length is 20 -35 m. Well discharge 100 -150 l/hour, specific yield is 8 -15 l/sec/m.</p>	
<p>5 Methodology: Field investigations on water, salt and other elements of water -salt balance of unsaturated zone, groundwater, cover loam and irrigated lands as a whole. Permanent balance sites by area of 100 -250 ha were established. Salt survey was undertaken; water -physical properties of soil and evapotranspiration were investigated.</p>	
<p>6. Results: During 50-es within the given lands open drainage systems have been constructed. But within pilot site open horizontal drainage was unsuccessful. During 1958 -1965 vertical drainage construction was started and 28 wells were completed. VDS operation permitted: - to change significantly groundwater level position: even under spring maximum it did not exceed 1.6 -2.0 m; - to increase essentially groundwater outflow which was 20 cu.m/day/ha or 7300 cu.m/year/ha. This led to certain increase in pumped groundwater salinity from 1.5 to 2.2 g/l; - to raise drainage modulus to 0.1 -0.37 l/sec/ha and to increase well yield to 100 -150 l/sec; - to manage by soil desalinization rate within the unsaturated zone and cover loam by creation of free volume for leaching (groundwater level was 3.5 - 4.0 m). Annual water balance was supported as leaching balance $B + O_c / ET = 1.26 -2.02$. Water duty was 7900 - 11760 cu.m/ha, taking into account filtration water. Total evaporation was 6390 -6900 cu.m/ha/year. Cover loam water balance became negative under given conditions, that provided irreversible soil desalinization. Difference between salts inflow and outflow was 3.8 (1965) -30 t/ha (1969). VDS effective operation permitted to increase cotton yield and land use efficiency. Before</p>	

VDS construction cotton yield was 1.4 t/ha under land use efficiency 0.30, but already in 1969 it achieved 2.5 2.8 t/ha and somewhere 3.5 t/ha: average growth was 0.8 t/ha. Investigations showed that VDS effect was found after 3 -4 years from start. Zone of active water exchange influence of VDS is about 100 m and salt exchange -25 -30 m.

H Suggested key-words			
1	Vertical drainage system	4	Water- salt balance
2	VDS efficiency	5	Desalinization rate
3	Soil water -salt regime	6	VDS's economic efficiency

I Most recent publications (maximum 3)			
1	Author(s): N. Reshetkina, K. Yakubov		
	Title: Vertical drainage		
	Publication details: VDS technical -economic efficiency for different climatic and soil conditions is considered. Possibility of management by soil water -salt regime and water -salt balance has been proved.		
	Year of publication: 1978	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/>
2	Author(s):		
	Title:		
	Publication details:		
	Year of publication:	free access <input type="checkbox"/>	restricted <input type="checkbox"/>
3	Author(s):		
	Title:		
	Publication details:		
	Year of publication:	free access <input type="checkbox"/>	restricted <input type="checkbox"/>