

REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

A	Project title: Irrigated lands water-salt regime management under vertical drainage within rice systems of Kzylkum scheme
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B	Topic n° : 1	Sub-topic n°: 2
1)	1	Technical field n°: 2

C	Project location Chimkent province, Kzylkum scheme	
	Country: Republic of Kazakhstan	Area: 777.000 ha
	Precise details if possible Country(ies): City(ies):	Locality(ies): Others(s):

D	Duration of the project:		
	Year in which the project was started 1989	Project completed: 1991	Expected completion date: 1990

E	Organizations and technical staff involved			
1	Supervisor/project coordinator (SURNAME, First name): Ikramov Rakhimjan		40%	
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	E-mail:	fax:	2)	
	Other counterparts:	Organizations (full name or acronym)	Surname	First name
1	Yusupov Shokhrat, SANIIRI		60%	
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	40%
2		%
3		%

G	Summary of research project (see instruction on page 1)
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1 Objective and technical fields:

Water-salt balance of rice fields investigations; irrigation water salinity growth and land use influence on water consumption.

2 Scientific and technical approach:

Water-salt balance formation within rice fields and irrigation system as a whole. investigation results allowed to definite main directions of specific water consumption reduction.

3 Environment characteristics:

Climate is sharply continental.

Average air temperature is 12.5-15.2⁰C.

Non-freezing period duration is 169-185 days with sum of temperatures 4100-4400⁰C. Precipitation is 138-330 mm.

Relative air humidity is 63-65 %, in summer 30-35 %. Evaporativity is 1040-1080 mm.

Geomorphology: Sirdarya alluvial flat valley.

Slopes are 0.0003-0.0005.

Lithology: quaternary depositions-cover loam (0.5-1cm; permeability 0.3-0.4 m/day), which is under laid by fine and middle-grained sands (12-53 m, Kp 3-4 m/day).

Before land development groundwater level was 2-5 m but by 1966-1967 it increased to 2.2-3.2 m (in spring), 0.8-2.2 m (in summer) and 2.4-2.8 m (in autumn). Groundwater salinity was 1.2-3.8 g/l, artesian water salinity was 3.5-5 g/l. Salinity type was sulfate-chloride.

Soils: grey-medow and consist from top to down of loam, sandy loam and sand. Unsaturated zone soil permeability coefficient is 0.4-1.0 m/day. Soils were non-salinized and slightly salinized, salinization type was sulfate.

Soil volume weight is 1.5-1.7 g/cu.cm, specific weight is 2.6-2.7 g/cu.cm.

Waterbearing thickness conductivity is 60-200 sq.m/day; water specific yield $\mu=0.2$. Soil permeability varies from 11 mm/hour in loam to 100 mm/hour in sands.

4 Parameters of Pilot Projects and Technical Solutions:

Irrigated area is 77.7 th. ha and 45.0 th. ha (net). Crop pattern: rice 50-52 %; alfalfa 18-20 %; grain 20-22 %; vegetables 5-8 %.

Water is supplied from Kzylkum canal and its distributors. Canals' extent is 2000 km and they mainly are earthen. Head water intake is 200 cu.m/sec. Kzylkum canal efficiency is 0.92, system's efficiency is 0.6-0.65. Collectors specific extent is 27.5 m/ha. There are 208 wells (depth 37-55 m, gravel-sand screen, drilling diameter is 1016 mm, screen length 10-27 m, well discharge 35-50 l/sec specific yield 3-5 l/sec/m).

5 Methodology:

Field investigations of water supply and water release accounting, evaporimeters' installation, observation of rice irrigation regime, soil water-salt balance and groundwater regime. Water-salt balance calculation.

6 Results:

As a result of field investigations was found:

- groundwater level within rice fields is 2.4-2.8 m (in spring), in summer it connects with surface water. Within the fields of other crops (alfalfa) water depth is 1.0-1.5 m, where irrigations are not performed . In winter depth is 2.8-3.4 m. Water salinity is 1.2-3.4 g/l, sulfate-chloride. Non-salinized and slightly salinized lands area is 70-75 % but due to irregular soil moistening saline spots appear.
- Drainage modulus was 3680-4280 cu.m/ha; within growing season 2820-3270 cu.m/ha; in non-growing period 860-1010 cu.m/ha. Under irrigated land efficiency 0.57 drainage modulus

related to net area is 6500-7500 cu.m/ha.

Drainage effluent salinity is 1.2-2.4 g/l, type is sulfate-chloride.

Number of vertical drains is 208, average discharge was 40 l/sec; pumped water salinity was 1-3.5 g/l, type is chloride-sulfate.

Rice yield varied within 5.0 and 5.96 t/ha, alfalfa 9.9-13.9 t/ha, grain 4.3-5.2 t/ha.

Actual irrigation norm was within the 1st year – 47100, 2nd year – 42000, 3rd year – 36.200 cu.m/ha.

From this amount 17960-19530 cu.m/ha (41.6-49.7 %) were expended. Water release from the fields was 2300-8000 cu.m/ha. Vertical filtration is wasted for outflow to collector-drainage network due to imperfect design and state of water-structures, which do not allow to regulate water-salt regime within the rice fields. Total evaporation (from water surface and transpiration) was 11400-12900 cu.m/ha and soil saturation was 3020-3800 cu.m/ha. Main directions of reduction of specific water consumption within rice irrigation systems are as follows:

reclamation system rehabilitation;

irrigated land efficiency increase;

water-structures state improvement.

H Suggested key-words			
1	Soil water-salt regime	4	Rice water requirement
2	VDS	5	Land reclamation state
3	Rice irrigation norm	6	Desalinization rate

I Most recent publications (maximum 3)				
1	Author(s): Sh. Yusupov			
	Title: Soil water-salt regime study and rice irrigation norm definition.			
	Publication details: Determination of total water-salt balance formation quantitative regularities'. Differences between actual and designed irrigation norm are explained. Rice irrigation norm calculation method is developed.			
	Year of publication: 1991	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/>	confidential <input type="checkbox"/>
2	Author(s):			
	Title:			
	Publication details:			
	Year of publication:	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"/>