

# REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

## QUESTIONNAIRE

<b>A</b>	<b>Project title:</b>	Development of technological schemes of irrigation of sand-loamy gypsum-bearing soils in Karshy Steppe.
----------	-----------------------	---

<b>B</b>	<b>Topic n° : 1</b>	Sub-topic n°: 4
<b>1)</b>	1) 4	Technical field n°: 4
	2) Category 01	

<b>C</b>	<b>Project location:</b> Kashkadarya province, state farm N 3	
	Country: Republic of Uzbekistan	Area: 50 ha (net)
	<b>Precise details if possible</b>	
	Country(ies):	Locality(ies):
	City(ies):	Others(s):

<b>D</b>	<b>Duration of the project:</b>	
	Year in which the project was started: 1980	Project completed: 1983
		Expected completion date: 1984

<b>E</b>	<b>Organizations and technical staff involved</b>		
1	Supervisor/project coordinator (SURNAME, First name): Bibik Victor Danilovich		100 %
	Organization: Uzgipromeliiovodhoz		Staff resources
	Address: 44, Navoiy str., telephone: (3712) 42-29-84 E-mail: fax: (3712) 424-29-85		
	Other counterparts:	Organizations	2)
	First name	Surname	
	(full name or acronym)		
1			%
2			%
3			%
4			%
	Other collaborators:	man-	
	years		

<b>F</b>	<b>Funding agencies</b>
----------	-------------------------

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> Study of technology of development of sand-loamy gypsum-bearing soils within the zone of new development. Objectives: Selection of method and technique of irrigation of lands with high permeability and low moisture capacity. The tasks are the following: a) to determine optimal versions of irrigation methods (surface, furrow, sprinkler); b) to define optimal combination of water distribution methods under furrow irrigation; c) to select the most rational combination of irrigation technique elements.</p>
	<p><i>2 Scientific and technical approach:</i> Field investigation included: - selection of testing site; - development of irrigated technological scheme; - determination of factors influencing streams distribution uniformity; - definition of the irrigation technique elements; - definition of optimal norms and number of irrigations depending on agricultural crops and irrigation technique;</p>
	<p><i>3 Environment characteristics:</i> Climate is sharply continental. Monthly average temperature is 25,4 °C in summer, maximum is 50°C. Winter minimum temperature is - 10°C. Frost-free period duration is 215 days. Precipitation is 146-300 mm. Wind speed is 2-4 m/sec in north-west direction. Relative air humidity is 48-55 %, during growing season - 35-44 %. Sum of positive temperatures (more than 10°C) is 2980 °C. Evaporativity is 1573 mm. Geomorphology: sloping corrugated plain made of proluvial sediments. Relief is corrugated with slope 0,001-0,005 to north-west. Relief under irrigation is subjected to erosion and subsidence. Soils: Light serozems-takir and meadow-takir. Mechanical composition shows sandy loam, light and medium loam. Groundwater level is 10 m and more. Water is brackish, sulphate-chloride. Permeability coefficient for sandstone is 1 m/day, for sand- 5 m /day and for clay-0,01 m/day. Soil volume mass varies within 1,33 and 1,55 g/cu.cm, at depth lower 8 m. it increase up to 1,66 g/cu.cm. Specific mass is 1,64-2,70 g/cu.cm, porosity is 37,4-49 %. Physical-technical soil properties: moisture at the limit of flow is 0,18-0,26, plasticity number is 0,04-0,17. Gypsum is solvable provoking suffosion, its content is 0,17-14,9 %. Permeability coefficient is 0,001-8,4 m/day, water absorption is 1,1-1,2 cm/hour.</p>
	<p><i>4 Parameters of Pilot Projects and Technical Solutions:</i> Experimental site area is 50 ha. It was started to develop in 1981-1982. Site surface was not graded. Slopes are 0,08 for cotton cultivation, for vegetables and melons - 0,008. Soils are represented by light sandy loam and underlaid by gypsum-bearing layers.</p>

Irrigation was performed according to the following technologic schemes:

1) Cotton irrigation from elastic hoses on the area of 22 ha was performed in furrows. Water was supplied by pump УНП-200/5 through the pipeline; feeding pipeline is laid in the middle of the site. It is made of aluminium, polyethylen joints were located every 72 m for connection with elastic hoses. For irrigation water distrybution elastic hoses with diameter 350 and 160 mm were used which are provided (every 0,6 m) by emitters of high resistance.

2) Vegetables irrigation by sprinkler units "Volzhanka" was performed within the site with area of 60 ha. Two mains were laid on the land surface made of aluminium with diameter 220 mm and length 600 m, connected with electric pumps. Wing's length is 300 m, number of sprinkler - 32, irrigation area - 0,72 ha.

#### *5 Results:*

Study of irrigation technique was carried out in compliance with "Methodological guidelines for field tests on furrow irrigation technique study".

Water supply regularity to the furrows was determined by multiple measurements by volumetric method under different regimes of the technique operation.

#### *6 Results:*

Within the control site phenological observations showed that on 10-12 days after irrigation cotton withering signs due to moisture shortage appear. This proved assumption about 0,8-1,2 m horizon drying up on expense of total evaporation.

Thus, irrigation norm increase destroys optimal ratio between irrigation regime, number of irrigations and irrigation norm. Within the testing lots cotton irrigation norm, calculated for 80-85 % of field moisture capacity, was 950 cu.m/ha for 0,5 m layer. Vegetation irrigations under ordinary irrigation regime and technology by duration of 24-36 hours under permeability 12-24 mm/hour (120-140 cu.m/hour) achieved 4-8 th.cu.m/ha which significantly exceeds total crop requirements (by 1,3-2,2 times).

Tests showed possibility of irrigation of soils without structure by irrigation depth 1000 cu.m/ha without significant releases. Optimal soil moistening was achieved within the root zone. Soil permeability was 25-40 mm/hour. Minimum water capacity of 1m layer did not exceed 14-20 % of weight.

The following conclusions were made:

- watering hose diameter from 160 to 350 mm is acceptable;
- elastic hose trace should not have sharp changes in slope;
- watering hose length depending on its diameter should not exceed 125-200 m;
- head within elastic hose should not fall to 1,5-2,5 of its diameter;
- furrow length under distance between them 0,6 m and slope 0,008 should be 50-80 m with discharge not more than 0,3 l/sec;
- irrigation of soils without structure could be performed without grading. Watering depth should be less than 1000 cu.m/ha and number of irrigations should be more (6-8 irrigations during growing season).

Under vegetables and potato aluminium pipelines were tested: TAP-150; PAP-100 and DM "Volzhanka". Tests showed that there is no need for land grading for pipeline TAP-150. Under slope 0,008 and more furrow length should be 50-100 m and discharge into the furrow - 0,08-0,3 l/sec.

Rigid pipelines could be used as a watering and as conveynce as well.

Waterings by depth 900-1000 cu.m/ha by DM "Volzhanka" ls are in efficient.

Cotton yield within the first year of development was 1,1-1,4 t/ha, within the second year it was 1,8-2,0 t/ha.

Onion yield under 11 waterings with the interval 8-10 days was 5,8 t/ha.

Potato yield was 7,2 t/ha under watering with interval 14-16 days since May till October and 120 kg/ha ammophos and 300 kg/ha ammonium sulphetre application.

Economic effectiveness was 64 rouble/ha.

--

<b>H Suggested key-words</b>			
1	Sandy-loam gypsum-bearing soils	4	moisture capacity
2	irrigation depth	5	furrow irrigation
3	permeability	6	irrigation technique

<b>I Most recent publications (maximum 3)</b>			
1	Author(s): N. Luchinin, R. Gubaidulin		
	Title: Development of irrigation technological schemes for sandy-loam gypsum-bearing soils of Karshy Steppe.		
	Publication details: Selection of irrigation method and technique for gypsum-bearing soils with gypsum layer on depth 0,8-2 m using elastic hoses.		
	Year of publication:	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/>
2	Author(s):		
	Title:		
	Publication details:		
	Year of publication:	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/>
3	Author(s):		
	Title:		
	Publication details:		
	Year of publication:	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/>