REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

A	**Project title:** Experimental investigations of in-soil cotton irrigation technique and technology on new developed lands of Golodnaja Steppe.

B	**Topic n° :** 1	Sub-topic n°: 4
1)	01	Technical field n°: 4

C	**Project location** Sirdarya province, Akaltinsky district state farm N 10-a		
	Country: Republic of Uzbekistan	Area:	120 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 1975	Project completed: 1982 Expected completion date: 1982

E	**Organizations and technical staff involved**	
1	Supervisor/project coordinator (SURNAME, First name): Lunyov Victor	50%
	Organization: SANIIRI Address: 11, Karasu-4, Tashkent telephone: E-mail: fax:	Staff resources
Other counterparts:	Organizations (full name or acronym) Surname First name	2)
1	Stulina Galina, SANIIRI	50%
2		%
3		%
4		%
Other collaborators:	man-years	

F	**Funding agencies**	
	Full name or acronym	Percentage of project finance provided
1	Glavirsovhozstroy	100%
2		%
3		%

G	Summary of research project (see instruction on page 1)

1 Objective and technical fields:

Reduction of irrigation water losses, irrigation process automation, ecological situation improvement.

Objective: Development of in-soil irrigation technique and technology .

2 Scientific and technical approach:

Study of network parameters, irrigation technique elements, irrigation regime providing, land use and irrigation efficiency increase and stable high yield.

3 Environment characteristics:

Pilot site'specific conditions are typical for new developed lands of Golodnaja Steppe. It is located within alluvial plain which is constituted by quaternary sediments.

Relief is flat with slope 0.0015. Soils are grey-medow, non-salinizated with small spots of slightly salinizated. Solid residue within 1 m – layer varied within 0,5-1,2 %, chlorine-ion content is 0,02 %. Salinity type is chloride-sulfate. Soil mechanical composition shows light and middle loam with gipsum and carbonate. Soil permeability is 0,52 mm/minute. Full field moisture capacity is 21 % to soil weight, volumetric mass is 1.20-1,35 g/cu.cm, porosity is 48 %, specific weight is 2,60-2,67 g/cu.cm. Groundwater is brackish (to 4 g/l), its level is 2,7-30 m within autumn-winter period, within growing period level increases on 0.5-0.6 m.

4 Parameters of Pilot Projects and Technical Solutions:

Field investigations and observations were undertaken within the network on dynamics of water movement by methods of neutron activation, lithium marks and tenziometers; termo-dynamics of water into the soils; soil salinization; cotton water consumption by method of heat balance; water discharge; phenological observations; water salt balance of unsaturated zone; groundwater level and salinity, as a control site was taken field with furrow irrigation.

5 Methodology:

In-soil irrigation system is constructed within area of 120 ha net and connected with typical flume network. It consists of underground pipeline network: distributive tubes d – 150 and 250 mm, polyethylene tubes d – 12.5 mm. Distance between pipelines is 100 m, between tubes – 1.2 m. Perforation holes diameter is 2.0-2.5 mm, distance between then is 0.1 m on tubes d – 20 mm and 0.4 m on tubes d – 12.5 and 16.0 mm.

Watering tubes' length is 100 m (d – 20 mm), 40 m (d – 12.5 mm) and 60 m (d – 16 mm).

Pipeline is circular that allows to flash tubes from sediments.

Depth of distributive tubes is 0.6 m, watering tubes – 0,45 m. Water comes from settling tank length 50 m. In-soil irrigation system is equipped by regulation devices and gate-drossels.

6 Results:

Study of in-soil irrigation technique and technology showed maximum efficiency of watering tubes d – 20 mm with perforation holes every 0,1 m. Irrigation optimal regime consist of 4 waterings irrigations by duty 800-1100 cu.m/ha and irrigation norm 4,3-4,6 t.cu.m/ha net. Specific water discharge along the watering tubes is 0,005 cu.m/hour/m. Water movement rate within distributive pipes was 0,5 m/sec.

Under in-soil irrigation and capillary water movement soil water regime is defined by soil water-physical properties.

It is found that pilot site's soil contains 42 % airation pores, 50 % capillary pores with high permeability and 80 % with low permeability.

Airation pore's diameter is 11-15 mkm, pores with high permeability – 6-11 mkm, pores with low permeability – 0,2-6 mkm. Water conductivity coefficient is $10 \cdot 10^{-4}$ cm/min. Above mentioned parameter and ratio of different pore categories, value of water conductivity coefficient and height of capillary raising (2,5 m) provide favorable conditions on loess loam of Golodnaya Steppe.

Under irrigation by norm to 1,0 th.cu.m/ha upper border of wettering does not achieve land surface and upper 0-10 cm layer is kept dry and it prevents water physical evaporation, which is 20-25 % and under furrow irrigation 35-40 % of evapotranspiration. Along the soil profile evident zonal moisture distribution after irrigation is observed. Under norm 1,0 th.cu.m/ha mobile moisture (70-100 % of FFMC) is concentrated within 15-90 cm layer, while 35 % moisture is accumulated within the 30-60 cm layer.

20-25 % come to the layer 10-30 cm and 40-45 % come to layer 60-100 cm. Under increasing losses for filtration and physical evaporation increase. Circular system provides water supply from underground distributors to watering tubes from two sides and soil wettering is regular.

Field irrigation efficiency under in-soil irrigation is 0.95-0.97, operators capacity is 50-60 ha/season, irrigation water productivity is 0.92 kg/cu.m.

Under furrow irrigation (control field) irrigation norm net was 5.6-5.8 th.cu.m/ha, irrigation water productivity was 0,56 kg/cu.m.

Additional cotton yield was 1.0-1.5 t/ha; specific water expense was 1.3 times less; land use efficiency increased 7 % and operation's productivity – 2.5 times.

H	**Suggested key-words**		
1	Irrigation technology	4	Water discharge
2	In-soil irrigation	5	Water saving
3	Wettering regularity	6	Soil water salt regime

I	**Most recent publications (maximum 3)**			
1	*Author(s):* G. Stulina			
	Title: Soil water regime under in-soil irrigation of cotton in Golodnaja Steppe conditions			
	Publication details: Study of cotton in-soil irrigation technology and soil water regime under different irrigation regimes is considered. Optimal in-soil irrigation regime is determined which provides regular wettering and irrigation efficiency increase. Diapason of sucking pressure copes with soil optimal moisture watering duty and irrigation norms, specific water discharges and water saving under in-soil irrigation, cotton yield are shown.			
	Year of publication: 1979	free access [x]	restricted [ ]	confidential [ ]
2	Author(s):			
	Title:			
	Publication details:			
	Year of publication:	free access [x]	restricted [ ]	confidential [ ]
3	Author(s):			
	Title:			
	Publication details:			
	Year of publication:	free access [x]	restricted [ ]	confidential [ ]