

REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

A	Project title: To develop irrigation technological progresses on sites with slight and without slope.
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B	Topic n° :1	Sub-topic n°: 2
1)	1	Technical field n°: 3
2)	Category n°: 01	

C	Project location:		
	Country: Turkmenistan	Area: 24ha	
	Mary province, Turkmenkala district, collective farm «Leningrad»		

D	Duration of the project		
	Year in which the project was started: 1974	Project completed: 1985	
		Dates of Expertise: 1985, 1990	

E	Organizations and technical staff involved			
1	Supervisor/project coordinator: Sedov Orazdurdy Organization: TurkmenNIIGIM Address: 30, Ostrovsky str. Ashgabat Tashkent telephone: 24-74-35 E-mail: fax:			%
				Staff resources 50
	Other counterparts:	Organizations	Surname	First name
1		Nursakhatov Ovez		
2		TurkmenNIIGIM		
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	<p>Summary of research project</p> <p>1 Objective and technical fields: Land productivity increase on the base of irrigation water distribution improvement within the irrigation scheme. Objectives: Water use improvement, land use efficiency increase, irrigation efficiency development, irrigated land productivity increase on the background of close irrigation network.</p> <p>2 Scientific and technical approaches: Irrigated land fertility improvement is based on proper irrigation water distribution within field by close irrigation system construction, which provides soil moisture equality all over the area and along the furrows length, optimal conditions for growth and germination of cotton plants. Investigation meaning: Development of optimal parameters of irrigation technique elements, which provide irrigated land productivity improvement, reduction of water losses for seepage, water saving and cotton yield increase.</p> <p>3 Environment characteristics: Climate conditions are characterized by high temperature in summer (to 45 °C) and moderate temperature in winter (10-15 °C). Average annual air temperature is 16 °C, average monthly: in summer +30 °C, in winter +5°C . Sum of effective temperature is 5200-5300°C . Annual precipitation is 150-200 mm mainly in autumn -winter time. Average annual air humidity deficit is 14,7 mb, in July-August it is 30 mb, in winter 4 mb. Evaporation from aquatic surface is 1850mm. Wind velocity is 1,8-3,3 m/sec. Plain slope is 0,002-0,0005 to north-east. Quaternary sediments have alluvial-proluvial origin. Cover layer with thickness of 5-10 m is constituted be loam and sandy loam with permeability coefficient 0,1-0,5 m/day. It is underlaid by fine and small-grained sand with permeability 2-3 m/day. Groundwater level is 1,4-1,7 m during growing period to 2,5-3,0 m in autumn-winter time. It's salinity is 1,5-5,0 g/l for TDS and 0,3-0,8 g/l for chlorine. Salinity type is chloride-sulphate. Unsaturated zone soils are heavy, middle and light loams with clay content from 17 to 40 %. Soil density is 1,5-1,67 g/cu.cm; solid phase density is 2,64-2,67g/cu.cm; porosity is 37-44%. 1 m layer salinity for TDS 0,22%, for chlorine 0,02%. The least moisture capacity of 1 m layer is from 31,6 to 34,% to soil volume.</p> <p>4 Projects and Technical Solutions: Field investigations were carried out within two experimental sites: (close irrigation network) and control (earthy canals, temporary ditches and leading out furrows). Area of each site was 12,5ha. Weirs were applied for water discharge management in furrows; observation wells for groundwater level and salinity dynamics study; devices and equipment for agriphysical and agri-chemical soil properties definition and furrow irrigation technique elements investigation. Soil moisture dynamics along the furrows, salt migration, reach time and water pouring in furrows under different discharge of irrigation streams were observed.</p> <p>5 Methodology: Irrigated area was 528,8 ha (440ha net). Main crop was cotton. Water was supplied by pumping through the pipelines. Close network extent was 11km, depth 0,6m. Pumping saturation consisted of 3 pumps 300 HD 90 with capacity of each 220 l/sec. Main pipelines consisted of asbestos -cement tubes d-500mm; irrigation tubes d-400, 300 and 200mm; irrigation pipelines length was 200-450 m . Along all pipes outlets were drilled. Hole diameter was 7mm. Area of simultaneous irrigation of all scheme with close irrigation network was 27ha. Flow width was 650m. Pilot site irrigation norm were 900-1000 cu.m/ha, irrigation number 6, irrigation depth 5500-6000 cu.m/ha. Total volume of leaching and water stock irrigations was 3000-5500 cu.m/ha. Close horizontal drainage within the pilot site was constructed with distance between drains 250m and depth 3,0 m. Total drainage extent was</p>
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21 km. Distance between cotton plants' rows was 90 cm, furrows' depth was 17-24 cm.

6 Results:

Pilot site's irrigated lands productivity before reconstruction was low due to low irrigation technique efficiency, shallow groundwater and its high salinity. Cotton yield did not exceed 1,6 t/ha. Close irrigation and drainage network construction allowed to change ecological-reclamation situation. Cotton yield increased to 2,05-2,25 t/ha and since 1980 it was 3,0-3,5 t/ha. Irrigation from close network was performed as follow: pumping station supplied water to conveyance pipelines from which it came to irrigation tubes and thorough special holes to furrows, necessary water volume was regulated by gates installed at the head of tubes. Constant head within the tubes was kept due to tubes telescoping joints. This provided equality of water streams in furrows along all front of irrigation. Transition to close irrigation network gave opportunity:

- to rise soil moisture equality to 0,81-0,83 due to quick and simultaneous regulation of all streams in each furrow; under irrigation pipeline length 250-450m discharges in furrows did not differ each other more than 9-14%;
- rise land use efficiency on 5-6% due to replacement of out-leading furrows by close pipelines;
- increase irrigation technique efficiency to 0,90 at expense of optimal conjunction of streams discharges and furrows length; removal of out-leading furrows and reduction of water losses for seepage and evaporation;
- increase labour efficiency of water operator 2-2,5 times, to reduce specific expenses on 2,5 rouble/ha (1984 prices);
- reduce irrigation use on 1800 cu.m/ha to compare with control site.

H	Suggested key-words		
1	Close irrigation network	4	Irrigation technique
2	Moisture equality	5	Furrow length
3	Water saving	6	Irrigation stream

I	Most recent publications (maximum 3)			
1	Author(s): O. Seidov, A. Meredov, O. Nursakhatov			
	Title: Cotton irrigation from close irrigation network on lands with slight slope.			
	Publication details: Investigations of cotton furrow irrigation under close irrigation network are described. Result showed that close irrigation network provides significant increase of water operator efficiency, water saving, increase of land use and irrigation technique efficiency and cotton yield.			
	Year of publication: 1980	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 type="checkbox"/>	restricted <input type="checkbox"/>	confidential <input type="checkbox"/>
3	Author(s):			
	Title:			
	Publication details:			

	Year of publication:	free access <input type="checkbox"/>	restricted <input type="checkbox"/>	confidential <input type="checkbox"/>
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