

REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

A	Project title: Development of technological schemes and irrigation technology on soils of high permeability.
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B	Topic n° :1	Sub-topic n°: 4
1)	4	Technical field n°: 4
2)	Category n°: 01	

C	Project location:		
	Country: Republic of Uzbekistan	Area: 1 ha (net)	
	Djizak province, Arnasay district, state farm №14 a		

D	Duration of the project		
	Year in which the project was started: 1980	Project completed: 1982	
		Dates of Expertise: 1983	

E	Organizations and technical staff involved			
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				Staff resources 100
	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	<p>Summary of research project</p> <p><i>1 Objective and technical fields:</i> Development of irrigation technics and irrigation indices. Objectives: prevention of unproductive water losses, increase of moistening uniformity, decrease of watering duration under preservation of positive features of traditional schemes of irrigation.</p> <p><i>2 Scientific and technical approaches:</i> Perfection of irrigation technics and technological indices of irrigation are based on water distribution over the field uniformity increase. As a basis in an idea to supply water into the furrow simultaneously in several points i.e. to divide it into separate irrigations partitions. This allows to eliminate negative events following certain provisions of qualitative distribution of water over the field: - to provide maximum uniform supply water to the field; - to provide sufficient length of furrow for mechanisms up to 400-500m; - daily irrigation area should be equal to daily productivity of the mechanisms; - to provide high land use efficiency equal to 0,9.</p> <p><i>3 Environment characteristics:</i> Climate is sharply continental. Annual average air temperature is 12,6 °C. Average monthly negative temperature occurs in January (-4 °C), absolute maximum occurs in December (-36 °C), absolute maximum in summer (45-47 °C). Frost-free period duration is 184 days with the sum of temperature 4397 °C. Annual precipitation is 200mm, including 4% (summer) and 15-20% (autumn), 30-40% (winter) and 40-50% (spring). Maximum air humidity is observed in December (82%), minimum in July (28%). North-wets wind predominates. Evaporativity is 1500mm. Total humidity deficit is 1300mm. Relief: SyrDarya river hilly alluvial valley. Soils: silty sandy loam, grey sand and loess loam. Groundwater level varies within broad limits. Groundwater salinity before irrigation was 10-20 g/l.</p> <p><i>4 Projects and Technical Solutions:</i> Technological schemes were tested on experimental site №3 in state farm №14 a. Site's area is 1ha (length is 290m, width is 40m). Number of furrows is 45 under spacing between them 90cm. Water for irrigation is supplied from South Golodnostepsky Canal (SGC) through inter-farm canal ЛР-15 and distributive canal ЛР-15-7. Further supply is made by flumes. Head over point of water distribution is 35-40 cm. Irrigation is performed over two sides: from the side of flume furrow length is 80m, from opposite side it is 120-130m. Total irrigated area served by one team is 160 -180 ha. Discharge to this area is 200 l/sec. For irrigation flexible pipeline from meliorative tissue is used with diameter 350 mm, length 30-60 m which is equipped by regulated outlets after each 0,9m. Allowable head in the beginning of the pipeline should be not less than 0,7m. Irrigation methods: cotton in furrows, alfalfa in tripes with small furrows, cutting by depth 8-12 cm. Cotton irrigation in furrows was performed under spacing between furrows 90 cm, furrow length 400m, discharge into furrow 1-1,5 l/sec. Simultaneously 160 furrows are filled in i.e. 7 ha. Irrigation norm was for cotton 600 cu.m/ha, foe alfalfa 8100 cu.m/ha On soils of high permeability the furrow was divided into 2-3 partitions. Water was supplied to each of these partitions separately. Furrow length was 200m, irrigation duration 24 hours, discharge in furrow 0,4-0,8 l/sec. Under discharge more than 8 l/sec furrow destruction occurred, less than 4 l/sec irrigation time was lengthened. On experimental plot with provisional irrigation network irrigation was made by hydrant with flexible tubes performed</p>
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from two parallel ditches. Water-intake off from the flume to the ditches was made of tissue with diameter 350 mm and length 5m. Water discharge from the flume to irrigation network was increased gradually during 5-10 minutes. Discharge at the head of pipeline was 59 l/sec, at the end it was 56,8 l/sec. Water losses for filtration were 1,2 l/sec.

5 Methodology:

On experimental site study of relief, lithology, texture and water-physical soil properties (for development and investigation of various technological schemes of irrigation on soils of high permeability) was carried out on the basis of standard methods. Test has foreseen the determine of field capacity. On control furrows leveling was performed to define slope of areas. Furrows were divided over 20m and indicated by milepost to define reach of irrigation stream. For study of water-physical soil properties within site, three 2-meters basin and sites were established to determine speed of penetration and calculate water discharge under furrow irrigation.

Simultaneously, technology schemes of irrigation in farms № 14, 14 a were investigated.

Investigations of scheme of irrigation were made:

- from temporary irrigation network in each channel, (objectives were following: arrangement of conveyance and temporary irrigation network in earthen to channel; water supply into temporary irrigation network; to define of average supply and efficiency of conveyance part of irrigation network;
- from irrigation pipelines, which consist of flexible irrigation hoses, (objectives were following: spreading and preparation of irrigation hoses to use; water supply to field by irrigation hoses; study of elements of irrigation technology under irrigation hoses use and determine quality of irrigation through soil moisture sampling.

Site with temporary irrigation network in earthen channel was irrigated by two temporary ditches which are parallel to each other and flume. Water take off into irrigation network was made through hydrants-outlet.

Observations of site with irrigation pipeline were carried out with fill flume. Water supply to the field was carried out through irrigation ditches made of meliorative tissue with diameter 350mm and total length 140m.

During to the tests 45 furrow was under observation, which consisted common irrigation front. Water discharge supplied to furrow was measured in 3-5 hours by volumetric method. Wells with depth 2m were drilled to determine initial moisture and depth of water table. Two wells were drilled after test completion to define moisture after irrigation. Leveling and description of general furrows state were carried out after test completion. Depth of water tables was defined in two days after test completion at the beginning, in the middle, and the end of site. Water supply to the field was measured by current meter, in open temporary irrigation network with water meter, to furrow from flexible irrigation pipeline was measured by volumetric method, and from open ditches was measured on length of furrows by Thomson's weir.

6 Results:

Investigations showed:

- average weighted water discharge into the furrow was 0,55 l/sec. At 6 hours irrigation front achieved 67m, after 24 hours -108 m and to the end of irrigation -150m.
- groundwater level was 2,1-2,3 m, 3 days after irrigation it was 1,-1,5 m;
- significant part of water over flowed to groundwater. Under close water level drainage began to work intensively. Together with water nutrients were washed out into collector drainage network.

New technological scheme was tested within area of 0,82 ha. Flexible hoses were used with diameter 350,250 and 160 mm, distributive hoses with diameter 250 and 160 mm.

Uniformity of discharge distribution is high discrepancies are 4-12%. Average jet flow front iteration under existing scheme was 203m, under new scheme 187m. Discharge into the furrow increased almost by 3 times. Average irrigation depth was 1402 cu.m/ha. Weight

moisture before irrigation on the border of root layer was 6-10% of dry soil weight; after irrigation it increased up to 10-28%.

Before irrigation groundwater level was 1,9-2,0 m, 3 days after irrigation it was 1,6-1,7 m .

H	Suggested key-words		
1	Irrigation depth	4	Feeling pipeleine
2	Water outlet	5	Irrigated furrow
3	Distributive joint	6	

I	Most recent publications (maximum 3)			
1	Author(s): N. Luchinin, S. Chapligina, A. Kadirov			
	Title:..Development of technological schemes and irrigation technology on soils of high permeability.			
	Publication details: Optimal schemes and irrigation technologies on soil of high permeability on results of investigations in state farms 14, 14 a, 16 in Golodnaya Steppe.			
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