

REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

A	Project title: Studies of Optimal Parameters of a Furrow Irrigation Technique and Technology Using a Pipe Distribution and Irrigation System in «Samgar» and «Khamzaaliev» state farms
----------	--

B	Topic n° : 1	Sub-topic n°: 0,2	Sub-topic n°: 0,4
1)	1	Technical field n°: 1	Technical field n°: 2
2)	Category n°: 01		

C	Project location		
	Country: Republic of Tajikistan	Area: 12000 ha	
	Leninabad province, Khudjand district, «Khamzaaliev» and «Samgar» state farms		

D	Duration of the project:		
	Year in which the project was started: 1963	Project completed:	1972
		Dates of Expertise:	1965, 1970, 1972

E	Organizations and technical staff involved			
1	Supervisor/project coordinator: Negmatboy Kurbonovich Nurmatov			%
	Organization: Tadjik Agrarian University			Staff resources 100
	Address: Dushanbe, pr. Rudaky, 146			
	telephone: 24-72-07	fax:		
	E-mail:			
	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		%

G	Summary of research project
<p>1 <i>Objective and technical fields:</i></p> <p>Mechanization of the irrigation process and raising the productivity of irrigated lands.</p> <p>Objectives: finding the shortcomings of a surface irrigation system, study of the elements of a furrow irrigation technique, determination of water expenditures for evapotranspiration, finding the irrigation uniformity coefficient, elaboration of parameters of a subsurface distribution and irrigation system for gardens and vineyards and its widespread adoption.</p>	
<p>2 <i>Scientific and technical approaches:</i></p> <p>Mechanization of the irrigation process is based on the replacement of the surface irrigation system by the subsurface pipe irrigation system with outlets to each row of plants allowing to distribute water uniformly to each furrow, to reduce surface release and to raise the irrigation technique efficiency.</p>	
<p>3 <i>Environment characteristics:</i></p> <p>The climate has large thermal resources. Average annual temperature is 13-15⁰C, duration of a frost-free period is 200-250 days, sum of positive temperatures is 4500-5000⁰C. Annual precipitation is 150-200 mm, evaporativity is 1100-1200 mm. Relative air humidity is 50-60% reducing down to 20-30% in summer.</p> <p>The territory of the state farms is situated within the borders of the alluvial foothill plain of the Syr Darya river. Relief is slightly corrugated. Inclination is 0,01-0,04. Soils are made of multilayer quaternary deposits with a sand-crashed stone upper layer 30-40 m deep with the coefficient of permeability equal to 0,5-1,0 m/day.</p> <p>The depth of ground waters is 20 m. Soils are stone-crashed stone, their volume weight is 1,4-1,7 t/m³, the least field capacity varies depending on soil stoniness from 800 to 1600 m³/ha. On the lands of the state farms cotton and other crops of the cotton crop rotation had been grown since 1963. Studies showed unprofitability of stony soils as for the growing season cotton was irrigated 20-25 times with the depth of irrigation more than 700-1000 m³/ha which exceeded designed norms by 1,5-2,0 times.</p>	
<p>4. <i>Parameters of Pilot Projects and Technical Solutions:</i></p> <p>Irrigated area is 10000 ha, land use efficiency is 0,80, farm specialization is gardening-vinegrowing. Water is supplied from Kayrakkum reservoir by P-1 and P-2 canals mostly with a concrete lining. The system efficiency is 0,70. Canals of the on-farm system have mostly earthen and partially concrete-lined channels. Therefore gardens and vineyards were planted there. The construction of the experimental plot on irrigation of gardens and vineyards using a subsurface pipe system was started. In 1972 the area of introduction of the pipe system was 1200 ha. The asbestos-cement pipe system 150 km long was constructed there. The distance between distribution pipes was 300-400 m, the distance between irrigation pipes was 100-200 m. Outlet bell-sockets in 2-4 furrows were made near each row of plants or with the distance between them of 3-4 m, diameters of orifices were 10-16 mm from which a watering jet of 0,3-1,0 l/sec. was given to each furrow. Head in pipes (1-4 m) was made by inclination of the territory.</p>	
<p>5 <i>Methodology:</i></p> <p>Field studies and observations were carried out on control (irrigation from a surface earthen system) and experimental (irrigation from a subsurface pipe system) plots. Discharge of canals and pipes was measured by Ivanov and Chipoletty weirs, discharge in irrigated furrows was measured by triangle weirs and using a volumetric method. Moistening uniformity along the length of furrows was measured by sampling of soils before and after irrigation, moistening contour was measured by digging out of pits 3 m long and 1,5 m deep. Water discharge for the total evaporation was studied both by change of the soil moisture and by weight soil evaporimeters. For calculation of water consumption using empirical</p>	

formulas (by I.A.Sharov, S.M.Alpatov, Blany-Criddle) meteorological data were used gathered by «Kayrakkum» station and during local observations carried out directly on the testing plots. For measurement of the soil moisture in a root zone a neutron device (NIV-1) was used. Experimental and control plots had the area from 10 to 25 ha.

6 Results:

Results obtained on the control plot (irrigation from a surface earthen system) and the experimental plot (irrigation from a subsurface pipe system) showed that the irrigation norm was 6500-700 m³/ha on the experimental plot (EP) and 15000-20000 m³/ha on the control plot (CP). Surface release was 10-12% (EP) and 20-25% (CP), reduced by 2 times. Moistening uniformity coefficient was 0,8 (EP) and 0,6 (CP). Total water consumption was 7,0-7,5 th. m³/ha (EP). For calculation of the vine water consumption Blany-Criddle formula is recommended.

Studies showed that the optimal furrow length was 100 m and 200 m depending on the degree of soil stoniness; optimal size of a watering jet was 0,3-1,0 l/sec. depending on the percentage of stony fractions. Calculated depth of irrigation of 500-700 m³/ha was given for 4-12 hours, 12-16 irrigations were made. Digging out of the vine root system showed that the depth of root penetration was 1,5 m.

Labor productivity was 1 ha/day-shift (surface system) and 2,5-3,0 ha/day-shift (pipe system).

Cost of irrigation was 39 ruble/ha (temporary system) and 19,5 ruble/ha (pipe system). Vine yield was 9-11 t/ha (experimental plot) and 6-7 t/ha (control plot).

With the additional investment of 1000 ruble/ha the net profit of the pipe system introduction was 432 ruble/ha or 43%.

H	Suggested key-words		
1	Vine water consumption	4	Elements of the furrow irrigation technique
2	Irrigation regime of a vineyard on stony soils	5	
3	Pipe distribution and irrigation system	6	

I	Most recent publications (maximum 3)			
1	Author(s): Vyacheslav Alexandrovich Surin, Negmatboy Kurbonovich Nurmatov			
	Title: Vine irrigation from a subsurface system, Moscow, «Kolos», p. 167			
	Publication details: Conditions of the vine growing and prospective regions for its cultivation are described. Water-physical properties of stony soils, irrigation regime and vine water consumption are shown. Analysis and finding the shortcomings of existing vine irrigation methods and furrow irrigation technique are made. For elimination of these shortcomings different types of a subsurface irrigation system are proposed. Design, construction and operation of a subsurface pipe system are considered. Profitability of its introduction on the area of 1200 ha is proved.			
	Year of publication: 1976	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"/>