

REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

A	Project title: Study of the Irrigation Technique and Technology of the Low-Pressure Drip Irrigation of «Tadjikistan» Type
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B	Topic n° : 1	Sub-topic n°: 2, 4, 5, 7
1)	1	Technical field n°: 1, 2, 4, 3, 1
2)	Category n°: 01	

C	Project location	
	Country: Republic of Tajikistan	Area: 1 ha
	Varzob district, «Komintern» state farm	

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

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: 24-07-83	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
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<p>1 Objective and technical fields:</p> <p>Elaboration of the universal drip irrigation system with simplified design of distribution and irrigation pipes and micro-outlets operating with low pressure which is made by inclination of the territory, with irrigation water turbidity equal to 2 g/l and size of particles up to 0,5 mm, guaranteeing uniform water distribution on the irrigation area.</p> <p>Distribution pipes on the testing plot were put down with inclination of 0,05-0,20; inclination of irrigation pipes with micro-outlets was 0,037-0,20.</p>
<p>2 Scientific and technical approaches:</p> <p>Creation of the low-pressure distribution and irrigation systems and simplified design of drip irrigation elements.</p> <p>Studies included scientific and practical grounding of the uniform water supply to the irrigation equipment and drippers, and uniform field moistening with the minimum expenditures.</p>
<p>3 Environment characteristics:</p> <p>The environmental conditions of the plot are typical for the Central and South-East Tadjikistan. Soils are made of alluvial deposit. Relief is gullied, inclination is 0,05-0,20. Soils are brown calcareous, volume weight is 1,45 t/m³.</p> <p>Brown calcareous soils have a gray color, humus content is 2,1-2,7% in the upper 20 cm soil layer. Soils are middle-loam, the least moisture capacity of 1 m soil layer is 2900-3000 m³/ha. Coefficient of permeability is 0,4-0,8 m/day. Average annual temperature is 14⁰C. Annual precipitation is 700 m.</p>
<p>4. Parameters of Pilot Projects and Technical Solutions:</p> <p>Irrigated area is 1 ha. Inclination is 0,05-0,20. Distance between drippers is 2 m, height of a П-shaped bend is 0,1-0,20 m, diameter of a micro-outlet is 3-4 mm, its discharge is 4-8 l/hour.</p> <p>Water is distributed to distribution and irrigation pipes through П-shaped bends 0,7 m high. Pressure is 1,0 m in a distribution pipe, it is equal to a П-shaped bend height (0,1-0,2 m) in an irrigation pipe. Simultaneous irrigation front is 100 m.</p>
<p>5 Methodology:</p> <p>Field studies and observations were carried out on the experimental (drip irrigation) and the control (furrow irrigation) plots with the area of 1 ha each. Moistening uniformity in furrows, drip lines and drippers was measured with the volumetric method. Moisture uniformity and moistening contour were measured with sampling and digging out of pits 1,5 m deep. With those pits root system development of apple-trees was measured. Apple-tree yield was measured after full ripening separately on the experimental and control plots.</p>
<p>6 Results:</p> <p>As a result of studies efficiency of the low-pressure drip irrigation system of «Tadjikistan» type was determined. Studies showed the following:</p> <ol style="list-style-type: none"> 1. Probability of the reliable operation P (t), discharge variations V_g and calculated water distribution uniformity of micro-outlets K_p installed along the length of irrigation pipes put down with different inclination (0,037, 0,1 and 0,2) were the following: P (t) = 92-97%; V_g = 0,5÷5% and K_p = 96÷97%. 2. Irrigation norm was 4400 m³/ha under drip irrigation (44 irrigations) and 5250 m³/ha under furrow irrigation (10 irrigations). Studies of morphological and physiological parameters of plants showed that average tree height was 297 cm under drip irrigation and 278 cm under furrow irrigation. Small (6,4%) exceeding was registered under different irrigation methods. However concerning leaf biomass the drip irrigation method has the largest advantage (30%). Digging out of root systems showed root richness of the soil layer 20-40 cm deep. At the distance of 50 cm from a tree it was 6,6 g/dm² under furrow irrigation and 34,7 g/dm² under drip irrigation. Surface release for flushing of the distribution and irrigation system was 25%

under furrow irrigation and 1-2% under drip irrigation.

Analysis of the moistening contour showed that with the water supply of a dripper equal to 60 l, its form was almost round with the diameter of 1,5-1,6 m, actual area of moistening under drip irrigation was 30% of the moistening contour.

Maximum daily water consumption was 26,7 l per tree at the beginning and at the end of the growing season and 40 l per tree in July.

Yield of the apple-tree garden was 24 t/ha under drip irrigation and 15 t/ha under furrow irrigation. Specific water expenditures per 1 kg of apples were 183 l under drip irrigation and 350 l under furrow irrigation. Analysis and estimation of the reliability of a water-treatment unit, distribution systems with П-hydrants and hydrants-automatic controllers of the low-pressure drip irrigation system of «Tadjikistan» type showed their efficiency. Elements of the system operated faultlessly during the growing season.

H	Suggested key-words		
1	Perfected low-pressure drip irrigation system	4	П-weir
2	Micro-outlets	5	Hydrant-automatic controller
3	Impulse drip irrigation system	6	

I	Most recent publications (maximum 3)			
1	Author(s): Negmatboy Kurbonovich Nurmatov, Tolmas Sayfulloev, Ruzikhon Kurbonov, Sergey Mikhaylovich Sidorov			
	Title: Temporary directions on design, construction and operation of the low-pressure drip irrigation system «Tadjikistan-1», 41 p.			
	Publication details: Conditions of using the low-pressure drip irrigation system; design and basic elements; organization of the territory and arrangement layouts; irrigation technology and regime; hydraulic calculation and design; technology of production, construction and operation of the system are described.			
	Year of publication: 1987	free access	restricted []	confidential []
2	Author(s): Negmatboy Kurbonovich Nurmatov			
	Title: Irrigation technology for sloping lands, 371 p.			
	Publication details: Environmental conditions are described, existing irrigation technologies and a cotton and vine irrigation regime are analyzed. Zigzag furrow irrigation technology and the technology of using the low-pressure distribution and irrigation system with vertical bends in places of water supply for furrow and drip irrigation are grounded. Division into districts of sloping lands is made according to irrigation methods and technology, efficiency of the suggested irrigation technology and technique is analyzed on the basis of widespread adoption.			
	Year of publication: 1987	free access [•]	restricted []	confidential []
3	Author(s): Islomkul Istamovich Ikromov			
	Title: Study and perfection of the drip irrigation system on sloping lands, 24 p.			
	Publication details: Design of perfected elements of the low-pressure drip irrigation system is shown. Method of engineering calculation, graphs and nomograms for hydraulic calculation of irrigation and distribution pipes and a micro-outlet of the perfected low-pressure drip irrigation system are shown.			
	Year of publication: 1991	free access [•]	restricted []	confidential []