

		project finance provided
1	Ministry for land Reclamation and Water management	100 %
2		%
3		%

G	Summary of research project (see instruction on page 1)
	<p><i>1 Objective and technical fields:</i> Determination drip irrigation system (DIS) application possibility and efficiency for vineyards within premountain zone. Optimal irrigation regime establishment providing high productivity of vineyards. Development of calculation and design methods for lands with complex relief.</p>
	<p><i>2 Scientific and technical approach:</i> Elaboration of technical and technological measures on water resources rational use and land productivity improvement, based on stable water-air regime within the root zone which meets plant physiological demand by means of DIS optimisation.</p>
	<p><i>3 Environment characteristics:</i> Pilot site located within premountain with altitude 620-650 m. Surface slope is 6-15°. Climate is typical for central Asia. Temperature in summer is 40-45 °C, relative humidity is 15-20 %. Precipitation is 300-350 mm: 50-55 % (January-March), 20-25 % (April-May) and 18-22 % (September-December). Average perennial sum of air humidity deficit is 3177 mb. Hydrothermic coefficient is 0,4. Sum of active temperatures within growing period is 2600-2700 °C. Soils: grey soils with low humus content; density is 2,7-275 g/cu. m. At depth of 146-350 cm similar loess loam is laid. Mechanical composition shows light loam with volum mass 1,1 g/cu. cm 0-100 cm layer porosity is 58-62,5 %. Soils are highly permeable with absorption velocity 250-300 mm/hour and filtration rate 10,1 mm/hour. Contents of nutrients are the following (%): humus -1, phosphorus -0,1, nitrogen -0,167. Soils are non-salinized. Groundwater level depth is 40-50 m, water is fresh.</p>
	<p><i>4 Parameters of Pilot Projects and Technical Solutions:</i> Investigations were performed as a field experiments. Soil initial properties were studied: volumetric and specific mass, full field moisture capacity, maximum hygroscopy, porosity, structure of skeleton and water permeability. Soil properties were studied according to standard methods'. Irrigation norm was defined according to actual water expense. Water discharge was measured by volumetric methods. Hydraulic parameters of DIS were determined by standard methods. Phenological observations were executed as well to follow plant development and growth. Grape roots state was studied. Agrobiological indices accounting was performed over 30 bushes of each version: number of eyes per bush, number of developed eyes and shoots, bush yield, cluster mass, berries mass, sugar content, juice acidity, exc. Hydraulic calculation of DIS on sloppy lands is performed on base of equation of fluid of variable mass movement.</p>
	<p><i>5 Methodology:</i> Areas of different grape sorts cultivation are: Kishmish Black - 3 ha, Taify Pinc - 0,3 ha, Kara Djandjal - 0,3 ha. By experimentis plan 8 versions of DIS and 2 versions of furrow irrigation were expected. Field size: version with terrace - 400 sq. m, without terrace with water regime 70 % of FPMC - 1200 sq. m, versions with regime 85 % -1000 sq. m. Each field consisted of four rows with 10 bushes in each row. Grape planting war executed in second half of December 1978 by one-year settling</p>

according to sceme 3,0 x 2,5 m and within the terraces - in one row with distance between bushes 2,5 m.

Experimental DIS was installed within the site. DIS consisted of mains (d - 110 mm), distributors (d - 90 mm), block (d - 63 mm) and watering polyethylen hoses (d - 25-40 mm).

Polyethilen pipeline length is 50-100 m. Drippers were inserted into polyethilen pipes and located 50 cm from land and from bushes. Distance between drippers was 2,5 m. Dripper mean discharge was 15-18 l/hour. Pipeline extent was 10 cm and number of drippers - 4000.

By experiment scheme it was expected within sites of Taify Pinc and Kara Djandjal grape's sorts two versions of DIS with preirrigation moisture keeping at the level of 70 % and 85 % of FFMC. Planting of one-year seedlings was performed in spring 1979. Field size for each sort was 450 sq. m. Size of field for table sorts - 0,6 ha. DIS consisted of pipes d-63; 32-40 and 20-25 mm, latter were equipped by drippers "Moldavia-1: after each 2,5 m ovel land surface on 50 cm distance. Pipeline length is 50 m, total extent is 2 cm, number of drippers is 756.

Irrigations during growing season were performed according to experimental scheme:

- for young vineyards (sort Kishmish Black) by furrow irrigation watering depth was 110 -210 cu. m/ha, number of watering - 17-29, irrigation intervals - 1-10 days and irrigation norm - 2,9-3,6 th. cu. m/ha;

- for fruit-bearing vineyards (sort Kishmish Black) by furrow irrigation watering duty was 120-190 cu. m/ha, number of watering - 19-28, irrigation interval 6-10 days, irrigation norm - 3,8-5,0 th. cu. m/ha;

- for young table sorts of grape: watering depth 160-240 cu. m/ha, number of watering - 13-21; irrigation norm 3,5-4,8 th. cu. m/ha.

6 Results:

Results of DIS application are as follows:

- grape Kishmish Black yield achieved 19,5t/ha, tablesort Kara Djandjal - 16,0 t/ha, Taify -16,5 t/ha which is on 5,0-6,0 t/ha more than it was under furrow irrigation.

Data about irrigation of fruit-bearing vineyards in Zaamin district are presented in the table below.

I sort Kishmish Black

INDICES	VERSIONS									
	I	II	III	IV	V	VI	VII	VIII	IX	X
Irrigation method	furrow	drip	drip 70 %	drip	drip	furrow	drip	drip 85 %	drip	drip
Soil moisture before irrigation										
Number of waterings irrigation duration, h	11	19	20	20	21	13	27	28	28	28
Watering depth, cu. m/ha	20	8	6	8	10	20	8	8	8	10
Irrigation intervals, days	650	160	120	180	220	540	160	160	160	190
Irrigation norm, th. cu. m/ha	11	7	7	6	7	7	5	5	5	5
	7,1	3,1	2,4	7,5	7,7	7,2	4,2	3,7	4,4	5,3

II Dining sorts

INDICES	GRAPE SORTS	
	Kara Djandjal	Taify Pinc

	VERSIONS			
	I	II	III	IV
Irrigation method	drip	drip	drip	drip
Soil moisture before irrigation	70 %	85 %	70 %	85 %
Number of waterings	16	22	16	22
Duration of irrigation, h	14	8	14	8
Watering depth, cu. m/ha	265	190	275	197
Irrigation interval, day	6-7	3-4	6-7	3-4
Irrigation norm, th. cu. m/ha	4,24	4,18	4,40	4,33

- irrigation norm under drip irrigation was on 40-50 % less comparatively with furrow;
- specific water expense per product units was for sort Kishmish Black - 330 cu. m/t, for Kara Djandjal - 270 cu. m/t, for Taify Pinc - 2,30 cu. m/t, that is 2 times less to compare with furrow irrigation;
- drip irrigation accelerated grape ripening (1—12 days) and provided relatively high sugar content (26-28 %) of grape berries before harvesting. Yield and economic indices for Kishmish Black grape are shown in table below.

INDICES	EXPERIMENT VERSIONS									
	I	II	III	IV	V	VI	VII	VIII	IX	X
Bush yield, kg	4,1	3,8	2,5	4,3	5,3	8,3	9,0	5,4	11,9	11,3
Yield, t/ha	53,8	50,0	33,1	56,3	70,4	109,0	118,9	70,9	157,0	149,1
Average cluster mass, g	159	165	166	179	178	179	179	175	248	252
Berries sugar content before harvesting, %	24,7	26,6	28,2	26,3	25,4	24,9	25,3	25,6	27,0	25,9
Water expenses, cu. m/h	1320	620	725	616	668	660	353	522	280	355
Net income for 4 years roubles (prices of 1984)	670	280	211	489	906	2305	2626	1423	3761	3660

Optimal soil moisture limit under DIS for kishmish and table sorts was 85 %. To support this moisture under conditions of Zaamin district it was necessary to perform 22-28 waterings by depth 160-180 cu. m/ha with irrigation interval 405 days. Irrigation norm was 4,4-4,5 th. cu. m/ha. Bioclimatic coefficient value is determined for vineyards under DIS as 0,18 mm/mb. Method for DIS design on sloppy lands allowed to develop common DIS design with optimal parameters: pipe diameter 75 and 25 mm. On base of these investigations resulting design of DIS for vineyards within the area of 200 ha was executed.

H	Suggested key-words		
1	Water saving technology	4	Adir lands
2	Drip irrigation	5	Irrigation regime
3	Vineyards	6	

I	Most recent publications (maximum 3)	
1	Author(s): T.Palvanov	

	Title: DIS application efficiency and technical means of its implementation .		
	Publication details: main technical means for DIS implementation are presented. Experimental DIS tests in conditions of Zaamin district are described.		
	Year of publication: 1986	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/> confidential <input type="checkbox"/>
2	Author(s): A. Nasimov, T. Palvanov		
	Title: Reserves of further development of wine-growing in Uzbekistan.		
	Publication details: Possibility of DIS application for kishmish sorts of grape in conditions of premountain zone are considered.		
	Year of publication: 1985	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/> confidential <input type="checkbox"/>
3	Author(s):		
	Title:		
	Publication details:		
	Year of publication:	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/> confidential <input type="checkbox"/>