REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

A	**Project title:**	Drip irrigation of vineyards in Koshrabad district of Samarkand province

B	**Topic n^{o} : 1**	Sub-topic n^{o}: 2
1)	01	Technical field n^{o}: 02

C	**Project location**		
	Country: Republic of Uzbekistan	Area: 2 ha	
	Precise details if possible Country(ies): City(ies):	Locality(ies): Others(s):	

D	**Duration of the project:**		
	Year in which the project was started: 1984	Project completed: Expected completion date:	1990 1985, 1986, 1990

E	**Organizations and technical staff involved**	
1	Supervisor/project coordinator (SURNAME, First name): Palvanov Timur	70 %
	Organization: SANNIRI Address: 11, Karasu - 4, Tashkent telephone: 7-3712 - 65-09-56 E-mail: fax:	Staff resources
	Other counterparts: Organizations Surname First name (full name or acronym)	2)
1	Nasimov Abdyrafic, UzNIISVIV	30 %
2		%
3		%
4		%
	Other collaborators: man-years	

F	**Funding agencies**	
	Full name or acronym	Percentage of project finance

		provided
1	Ministry of Agriculture	100 %
2		%
3		%

G	Summary of research project (see instruction on page 1)

1 Objective and technical fields:
Vineyards development in Koshrabad district on adir lands under reliabble and highly efficient method of irrigation. Study of drip irrigation system for vineyards irrigation and water saving optimal technology establishing.

2 Scientific and technical approach:
Creation of favorable water-air regime within the root zone providing normal water and thermic regime to plant by means of drip irrigation elements change and their optimal parameters definition.

3 Environment characteristics:
Experimental site is located within adir zone with altitude 700 m. Surface slope is 0,15. Groundwater level depth is 60-70 m. Climatic conditions are the following:

- sum of active temperatures within growing season (April 5- October 24) is 4100 ^{0}C;
- precipitation is 387 mm and is distributed irregularly: in April-May there is 33 %, in June-August 1 %;
- average ten-days temperature of the hottest month July is 27,2 ^{0}C:
- relative air humidity in summer is 17-20 %. Vineyard is located within desert zone and requires artificial irrigation and agrotechnic methods.

Soils: typical grey soils, by mechanical composition-light loam. Physical parameters are as follow:

- soil solid phase hardness (specific weight) - 2,719/cu. m;
- soil density (volum weight) - 1,27 g/cu. m;
- soil porosity - 53 %.

Soil water properties:

- maximum hygroscopy moisture - 3,83 %;
- full field moisture capacity - 21 % to absolutely dry soil and 26,7 % to soil volume;
- permeability coefficient is 0,72 m/day.

Soils are non-salinizated and do not contain gipsum. Nutrient elements composition: humus - 0,65 %, mobile phosphorus - 16,7 mg/kg; nitrate nitrogen - 12,5 mg/kg; ammonia nitrogen - 68,2 mg/kg; potassium - 120,1 mg/kg.

Irrigation water was supplied from wells. Chemical composition was (g/l): HCO_3 - 0,322, CL - 0,03, SO_4 - 0,137, Ca - 0,05. Mg - 0.018, Na - 0,119. Water was fresh.

4 Parameters of Pilot Projects and Technical Solutions:
Investigations were performed as field experiment. Initial soil water-physical properties were studied according to standard. Watering duties and irrigation norms were defined on actual water discharge. Water measurements were executed by volumetric method. Hydraulic parameters (head, discharge) were defined according to standard.

Soil moisture before irrigation was defined by sampling and control measurements by moisture-meter AM-11.

Phenological observantions were executed as well.

Statistical processing of data obtained was performed.

5 Methodology:

Investigations were performed on grape of Kishmish Black sort. Planting was executed in spring 1994 by one-year seedlings.

Version	Irrigation method	Expected moisture		Land development system	Scheme of bushes planting	Bushes settlement system
		1st half of vegetation	2nd half of vegetation			
I	furrow	70	70	terrace	6,0 x 2,5	horizontally laid vine
II	drip irrigation	70	70	-"-"-"-"-	6,0 x 2,5	-"-"-"-"-
III	-"-"-"-"-	70	55	-"-"-"-"-	6,0 x 2,5	-"-"-"-"-
IV	-"-"-"-"-	85	55	-"-"-"-"-	6,0 x 2,5	-"-"-"-"-
V	-"-"-"-"-	55	55	-"-"-"-"-	3,0 x 2,5	vertical vine
VI	-"-"-"-"-	70	55	-"-"-"-"-	3,0 x 2,5	-"-"-"-"-
VII	-"-"-"-"-	85	55	-"-"-"-"-	3,0 x 2,5	-"-"-"-"-

Field size: with terraces - 300 sq. m. without terrace - 1200 sq. m. There are two rows of 50 m leng th. Number of bushes within one version - 10. Drip irrigation system (DIS) consisted of mains d-9-10 mm, distributors d-63 mm, hoses d-25 mm and 16 mm polyethilen pipelines. Pipes were positioned 80 cm below land surface.
Watering pipeline length is 50 m, distance between drippers is 2,5 m; distance between drippers and bushes depended on bush age and was 30-50 cm for young bushes and 50-80 cm for old ones. Water supply to each field could be autonomously measured.
Irrigation technological elements are shown in the table below.

Technological elements	Furrow irrigation	Drip irrigation					
	I	II	III	IV	V	VI	VII
First irrigation date	10 - 12.05	10.05	10.05	4.05	15.05	10.05	4.05
Last irrigation date	9 - 10.10	15.10	11.10	28.09	11.10	13.10	10.10
Number of irrigations	7	24	20	25	12	23	28
Irrigation duration, h	30	12	12	12	12	12	12
average stream descharge in furrow, l/sec	0,3 - 0,1	-	-	-	-	-	-
average dripper's discharge l/hour	-	9,2	9,5	9,5	9,4	9,3	9,5
irrigation depth, l/bush	600	110	110	110	110	110	110
irrigation interval, 1st half of vegetation	17	5	5	4	10	5	4
2nd half of vegetation	27	6	12	12	13	9	9

irrigation norm th. cu. m/ha	2.8	1.8	1.5	1.9	1.8	3.5	4.2
Watering duty, cu. m/m	400	75	75	75	150	150	150

Analysis of drip irrigation performance showed, that irrigation water saving was during growing season 40-50 % comparatively with furrow irrigation. Drip irrigation on adir lands under 70-100 % and 85-100 % of full field moisture capacity (FFMC) provides good growth, development and high productivity of vineyards: under horizontally laid vines system 14,9-14,5 kg/bush and under vertical vines 11,1-12.9 kg/bush.
Grape's yield was higher on 7 years vineyards (14,65 -17,05 t/ha under horizontally laid vines and 9,57-9,83t/ha under vertical vines).
Vineyards growth, development and yield data are presented in the table below.

Indecies	Furrow irrigaton	Drip irrigation					
	I	II	III	IV	VI	VII	VIII
Number of eyes/bush	132,0	166	172	156	127	220	224
Number of eyes/ha	132	109,6	113,5	103,0	167,4	290,4	295,7
Number of shoots	90	87	112	133	63	151	143
Developed eyes percentage	44,0	52,4	61,6	85,3	49,6	66,8	63,8
Fruit-bearing shoots percentage	35,6	44,8	36,6	20,3	20,6	20,5	28,7
Number of flowers/bush	37	47	48	44	22	40	46
Fruit-bearing efficiency	0,41	0,54	0,43	0,33	0,35	0,26	0,32
Yield from bush/kg	10,9	13,7	14,9	14,5	4,9	11,1	12,9
Yield from hectare, t	71,9	90,4	98,3	95,7	64,7	146,5	170,0
Mean cluster mass, g	295	291	310	330	223	277	281
Total bush growth	26,5	22,8	22,0	43,0	21,0	28,4	29,8
Ripeninesspercentage	72,5	71,1	81,8	62,3	72,4	71,8	82,8

Differences between indices are connected with planting, density and number of plants. Vineyard's cultivation efficiency was assessed according to water expense per product unit,
which were: for furrow irrigation 394 cu. m /t, for drip irrigation: version II - 199, II - 153, IV - 198, V - 278, VI - 239, VII - 247 cu. m/t.
Most economically effective was DIS for without terrace planted horizontally laid vines (153-198 cu. m/t) against furrow irrigation (394cu. m/t)
Graded regime: 70 % and 85 % of FFMC during the half of vegetation and 35 % during the second half of vegetation-promoted normal growth and ripening of one-year shoots.
Main result is technology of DIS operation for sorts of grape within adir lands. According to vineyards' age this technology is divided into three periods: young vineyards - (1-3 years); entering into fruit-bearing (4-5 years) and fruit-bearing (more than 6 years)

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

I	Most recent publications (maximum 3)			
1	Author(s): M. Mukhtarov, T. Palvanov			
	Title: DIS design for adir lands of Yzbekistan.			
	Publication details: Common approach and design methods of DIS for adir lands are presented.			
	Year of publication:1989	free access [x]	restricted [ ]	confidential [ ]
2	Author(s):			
	Title:			
	Publication details:			
	Year of publication:	free access [x]	restricted [ ]	confidential [ ]
3	Author(s):			
	Title:			
	Publication details:			
	Year of publication:	free access [x]	restricted [ ]	confidential [ ]