REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

A	**Project title:**
	Cotton irrigation by magneto-activated saline water.

B	**Topic n^{o} :1**	Sub-topic n^{o}: 2
1)		Technical field n^{o}: 3
2)	Category n^{o}: 01	

C	**Project location:**		
	Country: Turkmenistan	Area: 24ha	
	Ashgabat province, Tedjen district, collective farm «Pravda»		

D	**Duration of the project**		
	Year in which the project was started: 1981	Project completed:	1985
		Dates of Expertise:	1985

E	**Organizations and technical staff involved**	
1	Supervisor/project coordinator: Ovez Hazarmamedov	%
	Organization: TurkmenNIIGIM Address: 30, Ostrovsky str. Ashgabat Tashkent telephone: 24-74-35 fax: E-mail:	Staff resources 75
	Other counterparts: Organizations Surname First name	
1	Nugraly Begliyev	25%
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	Summary of research project

1 *Objective and technical fields:*

Saline water use for irrigation. Magneto-activated use for cotton irrigation is considered in order to avoid toxic influence of this water on agriculture crops development and growth.

2 *Scientific and technical approaches:*

Study of irrigation water physical-technical properties changes under influence of magnetic field. Magneto-activated water impact on cotton yield and physical-technical properties of soil.

3 *Environment characteristics:*

Climate is sharply continental. Annual average air temperature is 15,6 -16.7 ^{0}C. Duration of the non- freezing period is 230-235 days. Hydrometric coefficient is 013-016. Annual precipitation is 135-178 mm. Average relative air humidity is 49%

Relief is represented by flat alluvial valley. Slope is negligible and equals 0,0006-0,0007 that is why area drainability is low. Soils are takir-medow with volumetric mass 1510 kg/cu.m under solid phase density 2650 kg/cu.m Soil is heavy loam with clay content 65%.

Aquifer with thickness 10-15m consist of loam, sandy loam and clay with permeability coefficient 0,1-0,2 m/day. Groundwater salinity is 10-20 g/l, water level depth is 2,4-3,4 m. Chemical composition is chloride-sulphate.

Tedjen river water salinity is 0,7-14 g/l, drainage salinity is water 10-15 g/l.

Soils: silty sandy loam, grey sand and loess loam. Goundwater level varies within broad limits. Groundwater salinity before irrigation was 10-20 g/l.

4 *Projects and Technical Solutions:*

Total pilot plot area is 25 ha.

The following options are considered during the field tests:

a) Cotton irrigation by water with salinity 0,73-1,4 g/l;

b) Cotton irrigation by magneto-activated water with salinity 0,73-1,4 g/l;

c) Cotton irrigated by water with salinity 2,0-3,0 g/l;

d) Cotton irrigated by magneto-activated water with salinity 2,0-3,0 g/l.

Irrigation network - earthy canals with efficiency 0,8-0,85. Technical conditions are satisfactory. Open collector with depth of 3,5-4 m is located at the north-east of the plot.

Specific extent of collectors is 20 m/ha.

5 *Methodology:*

Traditional existing irrigation norm was used. Soil water salt regime under cotton irrigation by fresh and saline water activated and non-activated by magnetic field. Magnetic activation was performed by UMO 1000-75 unit. Pilot plot with area 24ha was equipped by weirs for water discharge measurement 3 times a day. Water quality control was done by chemical methods based on oxygen and carbon -oxide-ion, hydrogen active ions concentration pH change indices. Water sampling was executed before each irrigation. Cotton growth and development observations were carried out since July 1 till September 1 at the beginning of the moth. These observations were followed by measurements of cotton main stem height, number of dubs and fruits and open and close boxes. Dispersion analysis of data obtained and forecast of irrigation water permissible salinity was used.

6 *Results:*

Before sowing water-stock irrigation with norm 2,5-3th. cu.m/ha in February-March was performed. This irrigation was also leaching at the same time. During the growing period 7 irrigations were carried out with norm 620-99 cu.m/ha in 1981 annual irrigation norm for control site was 6410 cu.m/ha and by fresh activated water 6370 cu.m/ha. Under saline water irrigation by non-activated saline water irrigation norm was 7285 cu.m/ha, by activated

water 7145 cu.m/ha. Total evaporation during growing period was 9150 cu.m/ha. Under cotton irrigation by fresh activated water average yield in 1984-1983 was 4.3 t/ha that is 0,5 t/ha more than on control site. Draining water with salinity 2-3 g/l use decreased yield to 3,3 t/ha. Within the field where cotton was irrigated by slaine activated water average cotton yield was 3,7 t/ha that is close to results under fresh water irrigation. During vegetation period pH value varied within 8.05-8.65 and after activation it was decreased on 0.02-0.06. Gas concentration in activated and non-activated water were different. In activated water oxide content was lesser but carbon -oxide content was higher than in non-activated water. For instance, total gas concentration in initial irrigation water use 89,67 cu.3/m and oxygen content was 27,01 mg/l. After water activation under magnetic field of H=90 KA/m total gas and oxygen content was decreased to 81,08 cm3/m and 24.39 mg/l respectively. Probability of total gas content is 0,85 and oxygen 0,76. From 100 samples of activated water in 63 increase was indicated from 0,22 to 3,52 mg/l. High carbon -oxide gas content in irrigation water increases its biological activity and dissolves some hardly soluvable salts and soil compounds. Due to this most mineral and organic combinations are assimilated by plants. In cotton irrigated by sweet and saline activated water fibre length is bigger. To the end of the tests (autumn 1983) insignificant salt accumulation in soil was indicated 0,1-0,25% from dry soil mass. Bigger salt accumulation (0,2-0,25%) was indicated within the field, where drainage water used for irrigation. Soil solution salt composition of different options differs insignificantly. Among anions sulfur acid residue prevails, among cations-sodium. Annual economic efficiency was 465 rouble/ha. In 1986-1988 total area of cotton irrigation by activated water in Turkmenistan was 1274 ha.

H	**Suggested key-words**		
1	Magneto-activated water	4	Soil salt regime
2	Nitrogen indice	5	Magnetic machine
3	Sweet and drainage water	6	Irrigation norm

I	**Most recent publications (maximum 3)**			
1	Author(s): Ovez Naarmamedov			
	Title: Magneto-activated water use in reclamation .			
	Publication details: Modern physical methods of water system activation are considered. Magnetic equipment is described. Results of irrigation and leaching of Murgab and Tedjen oasises by activated water and efficiency of irrigation by activated water is shown			
	Year of publication: 1983	free access [•]	restricted [ ]	confidential [ ]
2	Author(s):			
	Title:			
	Publication details:			
	Year of publication:	free access [ ]	restricted [ ]	confidential [ ]
3	Author(s):			
	Title:			
	Publication details:			
	Year of publication:	free access [ ]	restricted [ ]	confidential [ ]