

## REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

### QUESTIONNAIRE

<b>A</b>	<b>Project title:</b> Production tests of sprinkler-unit DDF -100
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<b>B</b>	<b>Topic n° : 1</b>	Sub-topic n°: 4
1)		Technical field n°:
2)	Category n°: 01	

<b>C</b>	<b>Project location</b>		
	Country: Republic of Uzbekistan	Area: 23 ha	
	Tashkent province , Kalinin district, farm "NISTO"		

<b>D</b>	<b>Duration of the project:</b>		
	Year in which the project was started: 1972	Project completed: 1982	
		Dates of Expertise: 1972, 1982	

<b>E</b>	<b>Organizations and technical staff involved</b>			
1	Supervisor/project coordinator: V. Sevryugin Organization: SANIIRI  Address: 11, Karasu - 4, Tashkent telephone: 7 (3712) 650955                      fax: E-mail:			%
				Staff resources  100
	Other counterparts:	Organizations	Surname	First name
1				%
2				%
3				%
4				%
	Other collaborators:			man-years

<b>F</b>	<b>Funding agencies</b>	
	Full name or acronym	Percentage of project finance provided
1	Ministry for Land Reclamation and Water Management	100%
2		%
3		%

<b>G</b>	<b>Summary of research project</b>
<p><b>1 Objective and technical field:</b> To develop cheap mobile sprinkler-unit for small (10ha) and middle (30 -60 ha) fields on soils of high and middle permeability for cotton, vegetables, orchards, vineyards, cereals.</p>	
<p><b>2 Scientific and technical approaches:</b> Technology of sprinkler stream management development to obtain high quality rain; irrigation network elements development, providing water small losses.</p>	
<p><b>3 Environment characteristics:</b> Object of investigation is sprinkle-unit DDF -100 developed by SANIIRI together with OSKB-Irrigation within 1972 - 1980. Field tests were carried out within 1980 - 1982 on SANIIRI scientific - research station (NISTO), which is located in Kalinin district. Climate is sharply continental. Average air temperature is 13 °C, maximum is 40 °C, minimum 30 °C. Sum of positive temperature is 45 -47 °C. Frost-free period duration is 203 days . Precipitation is 270 mm, including 30% in winter, 40 -45% in spring, 25% in autumn, 5% in summer. Relative air humidity is 75 %. Wind velocity achieves 5-7 m/sec but usually does not exceed 3 m/sec. Soils: Loess loam with permeability 15 mm /hour. Groundwater level is 10 -18 m, salinity does not exceed 1 g/l. Soils are gray , non-salinized, middle and heavy loam. Volume mass is 1,43 g/cu.m. Relief is corrugated. On-farm irrigation network is earthen. Water is supplied by canal with capacity 180 -200 l/sec via pipeline. Field slope is 0,003 - 0,05.</p>	
<p><b>4 Parameters of Pilot Projects and Technical Solutions:</b> Sprinkler-unit DDF is long-stream sprinkler working on principle of sprinkler-boat (GBR), Big Skuirt (USA) and Jidkov machine (USSR). Unit moves on the road along canal and takes water from it. It is based on tractor DT-75 (90 hp) and has a special pump 13 k -6. Along with DDF - 100 its modifications were tested (for example, DDF -70 M analogy of Big Skuirt). Site's area was 23 ha, land use efficiency was 0,96. Irrigation canal's length is 240 -360 m, its efficiency is 0,75 - 0,8. Unit was tested on cotton irrigation and was compared with furrow irrigation. Length of furrow is 500 m, but was separated into 3 furrows.</p>	
<p><b>5 Methodology:</b> Soil water-air regime was studied by thermostat-wegiht method; water balance- accounting was performed according to standard methodology. Technological schemes of irrigation were calculated according to given layer moistening necessity. Data were processed by statistical methods.</p>	
<p><b>6 Results:</b> DDF - 100 width of seizure was 100 - 110 m, mean-weight drop diameter was 1,33 mm, irrigation efficiency - 0,6 ; discharge -80 l/sec; capacity -83,5 h.p. Jet diameter - 43mm, head before jet -48 mm. water post. Mean time of rain drops staying in the air is 3 sec. Drop evaporation at initial moment - 3,2%, after 5 -7 minutes - 0,22% ; settled on leaves - 2%. After leaves drying up transpiration ceased. Drop structural composition changed from 0,125 to 3mm. Drops removed by wind constituted by only drops of size to 0,5 mm. Out of this size was removed less than 1 %. Average evaporation from field within 150 days of growing season was 5,4 mm/day or 0,037 mm/min. Water duty was 20,5 %. Sprinkling efficiency was 0,98 without regard to water consumption and with regard to - 0,735. Yield was 1,93 t/ha and varied along the field's width within 20 -25% and along field's length 15 - 19%. On control field irrigated by DDA-100MA, yield variation was 17 -20% along width and 6% along length. Within the field irrigated by furrows yield was 1,43 t/ha and its variations along width was ± 42%, along length ± 50%. Yield growth within the field irrigated by sprinkles was 0,5</p>	

t/ha. Within the site under sprinkler irrigation 7 waterings were performed. Water consumption was 8070 cu.m/ha (100%) including: rainfall 1183 (15%), soil water stock 1373 (17%), net irrigation norm 5484 (68%). Water surface release was not available. About 5% net irrigation norm went below 1 m - layer. Moisture before irrigation was 50 -70 % of full field moisture capacity, after irrigation 75 -100%. Average moisture of 1m-layer within growing season was 78%, moistening depth 133 cm. Within the field under furrow irrigation distance between furrow was 0,6 m, length of furrow 170m, depth 22 cm, slope 0,02 - 0,05, discharge into furrow 0,1 - 0,2 l/sec. Number of simultaneously irrigated furrow was 250. Water consumption under 4 irrigations was 7078 cu.m/ha (100%) including: rainfall 1183 (17%), soil water stock removal 45 (0,6%), net irrigation norm 5912 (83,4%). Surface water release was 1777 cu.m/ha (25% of net irrigation norm and 23% of gross norm). Moistening depth was 163 cm, deep release was 20% of net irrigation norm. Average evaporation within growing season was 47 mm/day. Irrigation efficiency was 0,365 taking into account evaporation, and without regard to evaporation 0,55. Comparison showed that field irrigation efficiency under furrow irrigation was 0,55, under sprinkler irrigation 0,21. Yield distribution regularity along the field width under sprinklers was 15% higher and along its length - 38% higher. Irrigation water saving was 40%. Economic efficiency was 4679 rouble/ha per year.

H Suggested key-words			
1	Sprinkler unit	4	Moisture dynamics
2	Irrigation network	5	Water balance
3	Irrigation regime	6	

I Most recent publications (maximum 3)			
1	Author(s): V. Sevryugin		
	Title: Technological schemes of long-stream sprinklers and methodological approach to their working parameters definition.		
	Publication details: Different modifications of long-stream sprinklers are described, their parameters assessment is given.		
	Year of publication: 1981	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/> confidential <input type="checkbox"/>
2	Author(s): V. Sevryugin		
	Title: Mechanized irrigation and yield growth .		
	Publication details: Mechanized irrigation problems, main types of technique are described.		
	Year of publication: 1986	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 type="checkbox"/>	restricted <input type="checkbox"/> confidential <input type="checkbox"/>