

REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

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| A | Project title: Agricultural crops water requirements for definition of norm and date of cotton irrigations (state farm n1, Syrdarya province). |
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| B | Topic n° : 1 | Sub-topic n°: 01 |
| 1) | 1 | Technical field n°: 1 |
| 2) | Category 01 | |

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| C | Project location Syrdarya province, Ilyichev district, state farm n1 (G.Gulyam) | | |
| | Country: Republic of Uzbekistan | Area: | 10 ha |
| | Precise details if possible | | |
| | Country(ies): | Locality(ies): | |
| | City(ies): | Others(s): | |

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| D | Duration of the project: | | |
| | Year in which the project was started 1982 | Project completed: 1985 | Expected completion date: 1982, 1983, 1984, 1985 |

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|----------------------|---|--------------------------------------|-----------------|---|---------|------------|
| E | Organizations and technical staff involved | | | | | |
| 1 | Supervisor/project coordinator (SURNAME, First name): Inchenkova Olga | | 100% | | | |
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| Other counterparts: | | Organizations (full name or acronym) | | | Surname | First name |
| 1 | | | | | | % |
| 2 | | | | | | % |
| 3 | | | | | | % |
| 4 | | | | % | | |
| Other collaborators: | | man-years | | | | |

| | | |
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| 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 (see instruction on page 1)

1 Objective and technical fields:

To define regularity of cotton water requirements, to receive meteorological and reclamation parameters and parameters of cotton development for mathematical model of operative forecast for vegetation cotton irrigations norm and date within new developed zone of Golodnaya Steppe.

Objective: Cotton water requirements for water resources productivity increase.

2 Scientific and technical approach:

To obtain initial information for mathematical model: air temperature and humidity, wind velocity, precipitation, radiation balance, evaporativity, groundwater level, soil moisture and identify cotton water requirements regularity depending on meteorological parameters, water supply and soil moisture. Meaning: cotton water requirements definition and mathematical model creation.

3 Environment characteristics:

Climate is continental and has high diapason of temperatures, high sum radiation and seasonal precipitation distribution.

Average temperature is 12.5-15.1⁰C, in July – 27⁰C, in January – 0.5-2.9⁰C; maximum is 47⁰C, minimum – 34⁰C.

Frost-free period duration is 169-200 days. Sum of temperatures within growing season is 4000-5000⁰C.

Relative air humidity is 51-68 %; in December – January 70-85%, in July 27-49%.

Annual precipitation is 250-300 mm increasing to the mountains (430 mm). Number of days with snow cover is 30-34. Average cloudiness is 4-5 points. Average annual wind velocity is 1.7-2.6 m/sec.

Relief: slightly corrugated proluvial plain with slope 0.0002-0.0005 to north-west.

Lithology: bedrock is located on depth of 200-500 m and represented by cretaceous and tertiary sediments, overlaid by younger depositions.

Soils: loess-silty loam (1-2 m) grey soils, meadow-grey, grey-meadow, meadow-bog and bog soils. Experimental site's lands are slightly salinized. Unsaturated zone consists of light sandy loam (0-20 cm) sandy loam with gypsum stratum (20-30 cm).

Middle sandy loam (30-55 cm); coarse-grained sand (55-80 cm); light loam (80-130 cm); middle loam (130-165 cm); heavy sandy loam (165-175 cm); middle loam (175-210 cm); heavy loam (210-215 cm); small-grained sand (215-255 cm); middle sandy loam (255-275 cm); heavy loam (275-285 cm); clay (285-300 cm).

Groundwater level is 1.5-3.5 m, soil volume mass is 1.34-1.46 g/cu.cm.

4 Parameters of Pilot Projects and Technical Solutions:

Site area is 10 ha. Main crop is cotton. Irrigation was performed in furrows. Irrigation network is concrete flumes, technical state is satisfactory. Site is located between irrigation canal and collector.

5 Methodology:

Experimental site is equipped by means of measurement of all parameters of heat and water balance. Observations on cotton development within growing season were carried out: surface shaded by plants, root system development, etc.

6 Results:

Field tests allowed to calculate ten-days average temperatures and relative air humidity, wind velocity, soil temperature, total evaporation, radiation balance, turbulent heat exchange, heat flow into soil and cotton development parameters which permitted to find relationship for total evaporation and transpiration from cotton field, to foresee moisture distribution within root layer by means of mathematical model and transit to vegetation irrigations schedule and creation of mathematical model of operative forecast of irrigation regime with deviation no more than 15%. During observation period soil moisture before irrigation varied from 7.5 % (0.25 cm layer) and 30.4

% (100-125 cm layer) to 27.1 % (0.25 cm) and 32.3 % (100-125 cm) after irrigation. Bioclimatic coefficient was: 0.55-0.60 (April – May); 0.63-0.67 (June); 0.84-0.88 (July); 0.95-0.97 (August). Total evaporation of cotton measured by heat balance method, was in 1982 – 817 mm, in 1983 – 783 mm, in 1984 – 788 mm, in 1985 – 766 mm. Cotton sowing was carried out in April; within growing season 3 waterings were performed by depth 1100-2900 cu.m/ha; irrigation norm – 4700-5540 cu.m/ha. Cotton yield was 3.2 t/ha (1982); 2.4 t/ha (1983); 3.0 t/ha (1984); 3.0 t/ha (1985). Irrigation water expense was 2000 cu.m/tn (1983); 1820 cu.m/tn (1984); 1850 cu.m/tn (1985). In 1983 precipitation plus water supply was 485 mm, evaporation – 587 mm, soil moisture stock – 107 mm, inflow to unsaturated zone – 209 mm. Water-balance - 1984 differs from water balance - 1983 by higher soil moisture stock within autumn-winter period. That is why in 1984 water outflow from unsaturated zone in amount of 128.8 mm was fixed. Investigation results can be recommended for operative forecast and vegetation irrigation scheduling of cotton.

| H Suggested key-words | | | |
|------------------------------|--------------------|---|-------------------|
| 1 | Total evaporation | 4 | Air temperature |
| 2 | Water balance | 5 | Heat balance |
| 3 | Mathematical model | 6 | Groundwater level |

| I Most recent publications (maximum 3) | | | |
|---|--|---|---|
| 1 | Author(s): O.Luchenkova, E.Cholpankulov | | |
| | Title: Creation of standard water-balance stations and water requirements forecast. | | |
| | Publication details: Principles of water-balance station creation and method of operative forecast of agricultural crops water requirements. | | |
| | Year of publication: 1986 | free access <input checked="" type="checkbox"/> | restricted <input type="checkbox"/> confidential <input type="checkbox"/> |
| 2 | Author(s): M.Baklushin, O.Dudko, V.Dukhovny, E.Cholpankulov | | |
| | Title: Soil moisture distribution forecast with regard to hydro meteorological information | | |
| | Publication details: Methodology of soil moisture, total evaporation and transpiration from cotton field forecast | | |
| | 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 checked="" type="checkbox"/> | restricted <input type="checkbox"/> confidential <input type="checkbox"/> |