

REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

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| A | Project title: Study of water-salt regime of strongly saline soils of charagil sink of Karshy Steppe. |
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| B | Topic n° : 1 1) 2) Category 01 | Sub-topic n°: 1, 2 Technical field n°: 1 |
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| C | Project location Kashkadarya province, Karshy Steppe, state farm N 11 | | |
| | Country: Republic of Uzbekistan | Area: | 50 ha |
| | Precise details if possible Country(ies): City(ies): | | Locality(ies): Others(s): |

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| D | Duration of the project: | | |
| | Year in which the project was started 1974 | Project completed: | 1976 |
| | | Expected completion date: | 1977 |

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| E | Organizations and technical staff involved | | | |
| 1 | Supervisor/project coordinator (SURNAME, First name): Gulnara Khasankhanova | | | 20% |
| | Organization: Uzgipromeliovodhoz | | | Staff resources |
| | Address: 44, Navoiy str. Tashkent telephone: 7(3712) 422986 E-mail: fax: | | | |
| | Other counterparts: | Organizations | Surname | 2) |
| | First name | (full name or acronym) | | |
| 1 | Uzgipromeliovodhoz, | T.Khamzina | | 40% |
| 2 | Uzgipromeliovodhoz | A.Morozov | | 40% |
| 3 | | | | % |

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| 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 (see instruction on page 1) | | |
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| <p><i>1 Objective and technical fields:</i> Prevention of soil salinization and its productivity increase on basis of perfection of soil moisture availability criteria assessment in salinized and subjected to salinization soils. Objectives: improvement of water-salt regime management for soils subjected to salinization.</p> | | |
| <p><i>2 Scientific and technical approach:</i> Prevention of soil salinization and its productivity increase on basis of perfection of soil moisture availability criteria assessment in salinized and subjected to salinization soil for water-salt regime control.</p> | | |
| <p><i>3 Environment characteristics:</i> Climate is continental. Average annual temperature is 15-16⁰C, within warm period it is 23-24⁰C; maximum is 49-50⁰C; minimum is - 26-28⁰C. Frost-free period duration is 213-233 days with sum of temperatures for this period 4500-4800⁰C. Precipitation is 230-300 mm, within the desert zone it is 150-200 mm. Average wind speed is 3-4 m/sec, direction is north-east. Evaporativity is 1600-1800 mm, evaporation deficit is 1400-1500 mm. Relief: flat plain made of quaternary alluvial and proluvial sediments. Lithology: Loam with interlayers of clay and sand with thickness to 3.0 m. Soils: meadow-desert, meadow-takir. Soil permeability is 9-20 mm/hour. Full field moisture capacity within 1m layer is 13.1-16.5% (light soil) and 25.0-27.7% (middle and heavy soils).</p> | | |
| <p><i>4 Parameters of Pilot Projects and Technical Solutions:</i> Cultivated crop is cotton. Water supply is performed through concrete flumes Y- 16 and Y- 47 since 1974. Plots are drained by close drains with depth 3.2-3.5 m and specific extent 75-100 m/ha which were constructed in 1972-1973.</p> | | |
| <p><i>5 Methodology:</i> Field investigations of water-salt regime, capillary-absorbtion potential of soil moisture, soil solution salinity and groundwater. Two experimental plots are established within the site with area of 25 ha where regular observations were carried out. Plots were equipped by means of observation (tenziometers, etc.) and piezometric network. Laboratorial tests were executed to determine relationship between soil moisture potential (soil solution osmosis pressure) and soil moisture. Total pressure of soil moisture (Pw) was determined according to relation: $P_w = P_o + P_m$ (1)</p> | | |

For P_s - soil solution' osmosis pressure;

P_m - capillary-absorbtion pressure.

Soil solution osmosis pressure P_s was determined according to following relation:

$$P_s = 0.36 Hh = (Wh/w)^m.$$

Index "m" was determined from relation:

$$m = 0.15 (5 + \ln[Cl^-]/[SO_4^{2-}]).$$

6 Results:

State farm was established in 1974, in spring 1974 the first leaching by rate 4000 cu.m/ha was performed. During growing season 1974 4 cotton irrigations by depth 1100-1670 cu.m/ha were executed. In 1975 the second leaching and two vegetation waterings by depth 1830-1400 cu.m/ha were procured, in 1976 - leaching was much better comparing with previous years. Groundwater level rose on 7.0-1.5 m during three years of development.

During observation significant daily changes of soil potential were discovered. These changes can be explained by big differences in temperature between day and night and by change of moisture evaporated by soil. Actual values of potential coincide with calculated ones.

Calculations of total soil moisture potential show that within all period of observation available moisture in root zone occurs only during irrigations within short periods. Within 3-10 days medium available moisture occurs on depth of 25-75 cm and than it transits to hard-available and non-available form.

Actually irrigation intervals equal to 20-30 days are over-estimated. They should be decreased down to 10-15 days. Irrigation depth (800-2300 cu.m/ha) under annual irrigation norm 4000-5000 cu.m/ha are insufficient. Groundwater regime (depth is 2.0-2.5 m) permits water supply increase by 1.5-2.0 times.

While comparing capillary-absorbtion potential with osmosis potential is evident that osmosis potential predominates. Along with land desalinization by vegetation watering components of total potential become equivalent.

Analysis of field and laboratorial investigations allowed to determine empiric relations between salt composition and osmosis pressure of soil solution, moreover typical curves for relationship between capillary-absorbtion pressure and soil moisture for soils of different mechanical composition. This allows to assess available moisture on basis of ordinary chemical analysis and soil mechanical composition.

| H | Suggested key-words | | |
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| 1 | Leaching regime of irrigation | 4 | salt regime |
| 2 | irrigation interval | 5 | osmosis pressure |
| 3 | soil moisture potential | 6 | |

| I | Most recent publications (maximum 3) | | |
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| 1 | Author(s): A. Morozov, A. Artyukhova, V. Ignatikov | | |
| | Title: Calculation of osmosis pressure of soil solution on water extract specific electric conductivity. | | |
| | Publication details: Comparison of specific electric conductivity and easy soluable salts content in water extract 1:5, 1:1 and soil solution, extracted under "soil-water" ratio 1:0,4-0,3 allowed to find relationship for calculation on basis of chemical analysis of specific electric | | |

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| conductivity of soil solution and its osmosis pressure. | | | |
| Year of publication: 1978 | free access <input checked="" type="checkbox"/> | restricted <input type="checkbox"/> | confidential <input type="checkbox"/> |
| 2 | Author(s): M. Kondrakov, F. Serebryannikov, A. Morozov | | |
| | Title: Investigation of the projects of virgin lands irrigation and development . | | |
| | Publication details: Large irrigation systems perfection in Golodnaya Karshy Steppe and development of irrigation regime , drainage , irrigation technique and salinized lands leaching are considered. | | |
| | Year of publication: 1979 | free access <input checked="" type="checkbox"/> | restricted <input type="checkbox"/> |
| 3 | Author(s): | | |
| | Title: | | |
| | Publication details: | | |
| | Year of publication: | free access <input checked="" type="checkbox"/> | restricted <input type="checkbox"/> |