

WATER MANAGEMENT ON SOD-PODZOLIC SOILS WITH DRIP IRRIGATION OF POTATOES

Anas Aldiab - 1st year postgraduate student, *Institute of Amelioration, water management and construction named after A.N. Kostyakov, RSAU-MTAA, anasaldiab123@gmail.com*

Language supervisor: Erofeeva T. L., RSAU-MTAA, forlang@rgau-msha.ru

Abstract: *Currently, potato production in Russia is considered one of the priority areas of crop production, since this vegetable crop has high nutritional indicators. The amount of potato consumption in the Russian Federation is comparable to the amount of bread consumed. Growing potatoes is considered less expensive and less time-consuming than producing other vegetables. However, like most cultivated crops, potatoes need additional irrigation. When growing potatoes on agricultural land, the optimal water regime in the soil is achieved through irrigation systems. During the design of irrigation systems, an important stage is considered to be (the calculation of the irrigation regime), since it determines the main characteristics of the elements of the irrigation system. Methods for calculating the design modes of potato irrigation systems that currently exist for the conditions of sod-podzolic soils of watershed territories do not fully take into account the complex processes of water consumption and water exchange in the soil layer. In this regard, there is a need to determine some of parameters, which include: humidity control ranges, the study of biological coefficients, as well as coefficients that take into account the type of soil and climate zone.*

Keywords: Drip irrigation, Water balances, Water consumption, Irrigation rate, Precipitation, Moisture.

Scientific novelty:

1. water balances of sod-podzolic soils of experimental plots will be calculated in layer 0 ... 50 cm and in the aeration zone of the lysimeter 0 ... 150 cm;
2. Justification of the potato irrigation regime under the considered conditions will be carried out;
3. Will be determined the control range of the calculated moisture content of the soil;
4. We will obtain the formula for calculation the water consumption of potatoes;
5. Coefficients will be determined that take into account soil moisture in the growing period, as well as biological coefficients;
6. The distribution depth of potatoes root system will be clarified;
7. The mathematical model of A. I. Golovanov will be improved for potato irrigation regime under specified conditions.

Research goals and objectives: purpose and objectives of the research is water regime management on sod-podzolic soils with drip irrigation of potatoes. To achieve this goal, the following tasks will be defined and solved:

1. Irrigation scheduling of potato in the conditions of the non-Chernozem zone of Russia will be Justified.
2. Calculation of the necessary range of moisture for root layer in the soil will be Justified.
3. Will be determined the allowable depth in soil for potato irrigation
4. formulation of potato water consumption formula.

Research methods. The following methods will be used for research: water balance, the theory of groundwater movement, probability theory and mathematical statistics, physical and mathematical modeling. The experiments will examine different levels of moisture in the root layer of sod-podzolic soil of irrigated areas, and determine its impact on potato productivity. To do this, we will organize 4 experimental plots, each measuring 80 m². In this case, the plot will be divided into 4 accounting platforms with the size of 3,2x3,2 m.

To determine the effect of soil moisture on the potato crop, moisture will be maintained in the layer (0-50 cm), by drip irrigation in the following intervals: 1 – (0.60-0.70) field capacity ; 2 – (0.70-0.80) Field capacity ; 3 - (0.80-0.90) Field capacity; 4 – control (without irrigation).

To supply water, an irrigation network will be installed, consisting of pipelines laid both underground (32 mm in diameter) and on the ground surface (20 mm in diameter). To do this, a plastic tank with a volume of 3 m² will be filled with water. Water moves via a connecting pipeline to the pump and then to the irrigation network to the emitters.

The pumping station is installed in a reinforced concrete well with a diameter of 1.5 m and a depth of 2.0 m. the Grundfos CR 5-9 Pump has a pressure of 50 m and a flow rate of 4.5 m³/h. The soil moisture will be measured by the hH2-SM300 moisture meter (DELTA-T DEVICES LTD, production-England) in layers with a step of 0.1 m.

For this purpose, wells will be drilled at depths of 0-10; 0-20; 0-30; 0-40; 0-50 cm and 1 m, which will be reinforced with plastic pipes with a diameter of 40 mm. Soil moisture measurements will be performed once every 5 days, as well as before watering and after watering and precipitation.

Date of planting potatoes - may 15, harvest August 10-11. Elements of the water balance will be measured on each plot and lysimeter according to the water balance equation, which has the following form (mm):

$$\Delta \bar{W} = O_c + m + q - E$$

$$\Delta \bar{W} = W_k - W_h, \text{ where:}$$

- $\Delta \bar{W}$ - change in moisture reserves in the calculated soil layer;
- O_c - precipitation;
- m - irrigation rate;
- E - total evaporation;
- $+q$ - feeding the calculated soil layer from the lower layer;

- -q - infiltration of moisture from the calculated soil layer to the lower layer.

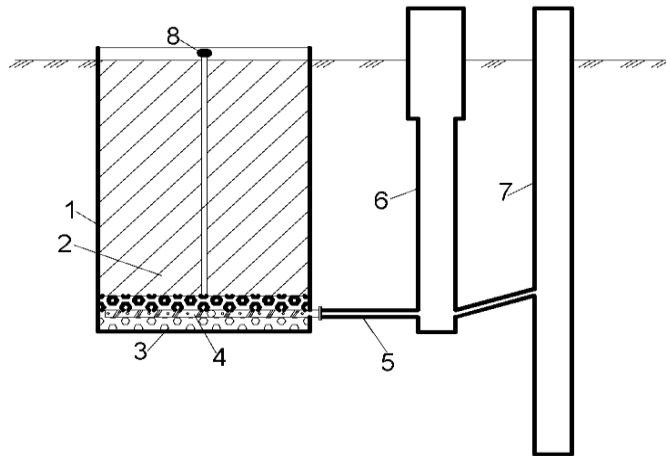


Fig.1. **Diagram of lysimeter**

1-Housing; 2-Soil monolith; 3-Pallet; 4-Drainage pipe; 5-Connecting pipe; 6-Compensation pipe; 7-Infiltration pipe; 8-Tecanat pipe

Expected result:

The formula for calculating the total evaporation of potatoes will look like:

$$E = k_w k_6 a d_s^b, \text{ where:}$$

- E: potato water consumption mm/day;
- k_w : coefficient that takes into account the moisture content of the calculated soil layer;
- k_6 : biological coefficient of potatoes;
- d_s : the sum of the average daily humidity deficits over a decade;
- a,b: empirical coefficients depending on the climate zone and soil type.

The relationship between productivity and irrigation rate will be like:

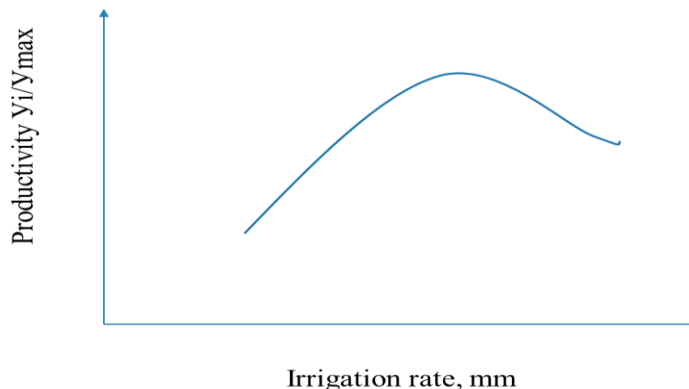


Fig. 2. **Graph of the relation of relative yield (Y_i/Y_{max}) of potatoes**

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AN ANALYTICAL STUDY OF THE REALITY OF PLANTING AND HARVESTING POTATOES IN THE SYRIAN ARAB REPUBLIC

Ahmad Alsankari 1st year postgraduate student, Institute of Engineering and energy named after V.P. Goryachkin, RSAU – MTAA, alsankariahmad@gmail.com

Abstract: *Land division in Syria, statistics on the number of tractors and combines, characteristics of agricultural holdings, types of soil spread, statistics on the number of labor, the reality of growing potatoes and the method of harvesting.*

Keywords: *tractor, soil, possessions, technical specifications, harvesting.*

The Syrian Arab Republic is located in the Middle East, on the east coast of the Mediterranean Sea. It borders on Turkey, Iraq, Palestine, Jordan and Lebanon. The climate in the SYR is subtropical Mediterranean on the coast and dry continental in the interior.

The total area of Syrian Arab lands is more than 18 million hectares. Plains (80%) of plateaus and valleys (15%), mountains and highlands (5%).

Potato cultivation is mainly limited to mountain ranges and is grown along the Mediterranean coast in the western part of the country in three main areas: in the highlands around Damascus (700–1400 meters above sea level), which produces about 30 percent of the annual production. Inland areas include (Hama, Homs and Algab) at an altitude of 200-500 meters above sea level, which account for more than 60 percent of national production, and the rest is located in the Coast region near Latakia and Tartus. Potatoes are usually grown in Syria on an area of about 30,000 hectares for three alternating periods: spring, summer and autumn. (It can get 35 tons / ha under good conditions).