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DRIP IRRIGATION OF OIL CROPS

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Abstract. *This article contains materials on use of water-saving irrigation technologies in order to save water resources under water shortage conditions. For this purpose, in the Surkhan-Sherabad oasis in conditions of desert-sandy soils, after cultivation winter wheat areas, oil crops were sown as re-cultures, the soybean and sunflower irrigation regimes were studied. At irrigation low-pressure technology of drip irrigation was used. The results of the conducted scientific researches are given and conclusions are given on introduction of the irrigation regime of oil crops and irrigation technology.*

Key words: *drip irrigation, irrigation regime, irrigation rate, cultivation, agro technical measures.*

1. INTRODUCTION:

The problem of water scarcity and its greater perceptibility in Central Asia, including Uzbekistan, and all this leads to the identification of serious problems in water distribution relations between the republics in these regions. The main cause of water deficiency is the volume of water resources not exceeding 70% of the average annual values that form in the main water sources of the Amudarya and Syrdarya rivers. In the future, with an increase in water deficiency, this problem is still acute and leads to the use of water-saving irrigation technology in the family farm, which is the main water user.

According to E.Zh. Makhmudov, the total demand for water (throughout the industry) of Uzbekistan, while maintaining the current state of the water management systems and irrigation network, is 69.4 billion m³, of which 59.9 billion m³ is for agriculture. If water deficiency is dependent on natural water availability at 80% the water limit was 14.3 billion m³, then at 100% water supply the water deficit is 10.1 billion m³ and this shows a decrease in the amount of water consumed to irrigate crops [1].

It is known that in the republic almost every year there is a shortage of water, so in most of the area of more than one million hectares that is free from winter wheat, repeated crops are not planted. In fact, the cultivation in these areas as secondary crops that are considered oil and chnyimi crops such as sunflower, soybean and other crops is of particular importance in meeting the needs of the population to the vegetable oil.

In the conditions of water shortage, only with the use of water-saving technologies, it is possible to grow these crops and get a high yield.

For this purpose, under the desert-sandy soil conditions of the Surkhan-Sherabad valley, the irrigation regime of soybean and sunflower grown on the plots freed from the seed crops has been studied. Watering is carried drip irrigation method using a low pressure drop system developed Tashkent Institute of Irrigation and Agricultural Engineering (TII & M CX).

Irrigation technology with the low-pressure drip method TI AND MI CX is 3-5 times cheaper than the technology of other drip irrigation systems, it is easy to manufacture its parts and fittings, it is also convenient and easy to install and operate in the field.

Improving and introducing a low-pressure drip irrigation system developed in Uzbekistan can lead to the saving of mineral fertilizers, combustible-lubricating materials and labor resources, increasing crop yields, improving land reclamation and most importantly saving water resources by 40-50% [2].

2. METHODS STUDIES:

The experiments were conducted by irrigation regime relative maximum field capacity (OPV) in embodiments 70-70-60 and 70-80-60% with grooves s and m drip irrigation method.

The soils of the experimental plot are of the type of desert-sandy soils, these soils are widely distributed in the lower part of Babatag, in the Kattakum massif and along the banks of the Amudarya. The total area of these soils in the Surkhan-Sherabad deserts is 130 thousand hectares. Of these, 10 thousand hectares of irrigated land.

According to their mechanical composition, these newly mastered soils belong to light loams (0–30 cm), sandy (30–90 cm) and cohesive sands (90–130 cm), the bulk density is 1.40-1.47 g / cm , porosity 44 - 47%, permeability 202.7-205.0 mm / hour, extreme field soil moisture capacity (0-100 cm layer) - 15.8%, the amount of humus in the topsoil layer is 0.46%, it is poorly supplied with phosphorus and potassium.

In the experimental plot, the dynamics of the groundwater level and mineralization are peculiar to the irrigation type, during the growing season the average depth is 302 cm and slightly mineralized (2-3 g / l).

3. RESEARCH RESULTS:

Agro technical measures were carried out according to the recommendations for the cultivation of sunflower and soybean crops. Under the above soil and hydrogeological conditions of studying the irrigation regime of soybean and sunflower for 3 years with various irrigation methods show that during furrow irrigation methods, when pre-irrigated soil moisture was 70-80-60% of the PPV, it was necessary to water soybean 9 times, and sunflower 7 times, the magnitude of irrigated norms with the degree of humidity of 70% of PPV was 510-600 m³ / ha, and with 80% - 500-550 m³ / ha. With drip irrigation method, irrigation amounts respectively amounted to 10 and 7 times the magnitude irrigation rates at a degree of humidity from 70% PPV was 205-245 m³ / ha, and at a degree of humidity of 80% - 200-235 m³ / ha [3] .

Drip irrigation method when supplying irrigation to the irrigated field is necessary to determine the flow of water droppers. For this purpose, on the basis of field and laboratory experiments, the water consumption of droppers in a low-pressure polyethylene hose was determined. According to the data obtained as a result of experiments, a graph showing the dependence of the water flow of the dropper to the pressure head (Fig. 1)

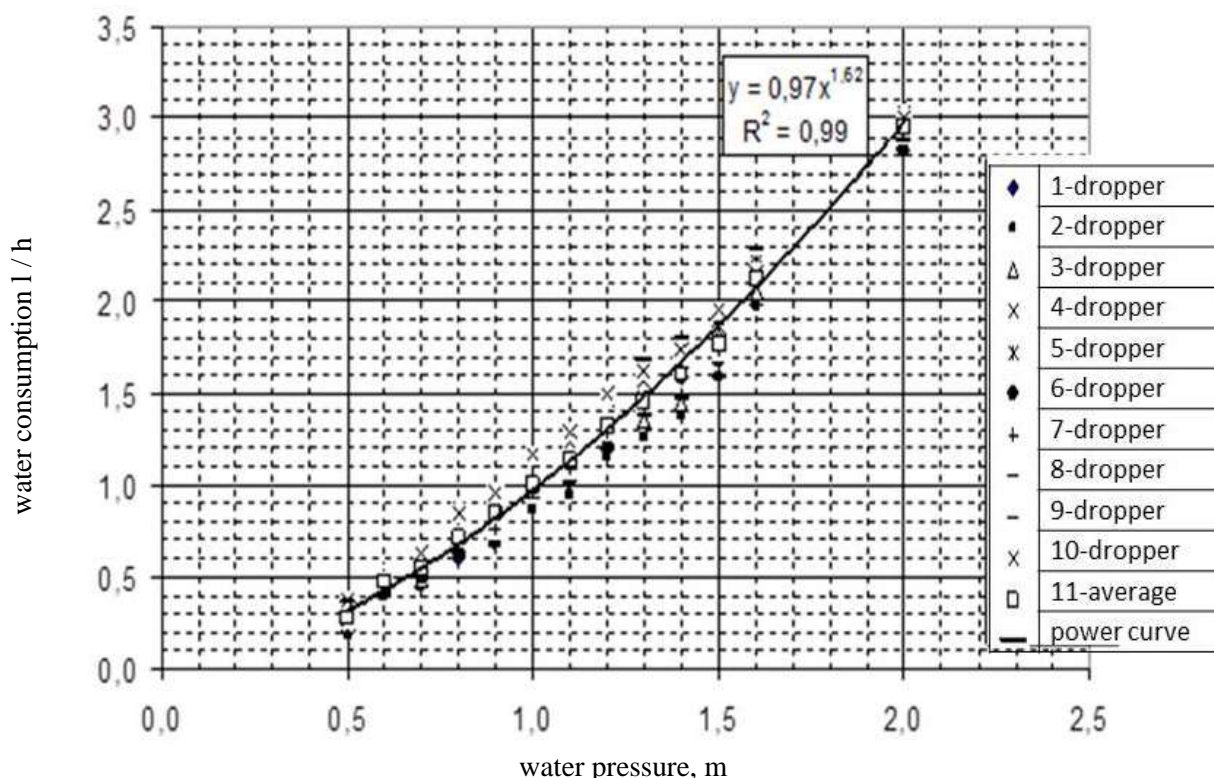


Fig. 1. Graph of dropper flow to pressure head - $Q = f(H)$

The resulting graph, i.e. curve line can be formulated by the following equation:

$$Q = f(H) = 0,97 \cdot H^{1,62}, L/h.$$

The data obtained as a result of research show that with the location of droppers in the irrigation pipe every 10 cm –M distance and with a dropper flow rate of 1 l/h the soil was fully wetted (above the FWL) 70–80 cm wide and 100 cm deep, while the dropper positioned every 20 cm distance was moistened and the width and depth were 65–70 cm, and at a location of 30 cm –m distance, each dropper moistened the soil across a width of 25-30 cm, at a depth of 60- 70 cm.

Based on the above results of experiments with drip irrigation of soybeans and sunflower in states with one dropper every 20 cm in the irrigation pipeline the distance was ensured by the flow rate of water in each dropper 1.5 l/h (\pm 5–7 min).

4. FINDINGS:

According to the data obtained under laboratory conditions to ensure water consumption in droppers of 1.5 l/h, the system was supported by 1.3 m of water head. Based on the results of research work carried out in irrigated desert-sand soil conditions of the Surkhan-Sherabad valley to study irrigation using low-pressure drip irrigation on re-sowed crops of soybean and sunflower, the following conclusions can be made:

- When the furrow irrigation methods for the preparation of pre-irrigation soil moisture 70-80-60% of the PPV, the value of irrigation norm in soybeans was 4800-4900 m³ / ha, and in sunflower 3750-3900 m³ / ha. With the drip method, these indicators were, respectively, in soybean 2475-2625 m³ / ha, and sunflower - 2040-2180 m³ / ha.
- With drip irrigation of crops of soybean and sunflower, as compared with furrow irrigation in the variant with pre-irrigated soil moisture of 70-70-60%, water saving amounted to 39.4-43.8%, and in the variant 70-80-60% water saving amounted to 42.5-49.2%.
- When cultivating soybean and sunflower crops with a low-pressure drip irrigation method, it is necessary to take an irrigation rate of 200-250 m³ / ha, an irrigation regime of 70-80-60%, water soybeans only 10 times, and sunflower 8 times, thus ensuring the production of soybean and sunflower up to 25 kg / ha.
- To ensure an optimal flow rate of 1.5 l/h of the dropper in the system of low-pressure drip irrigation, it is necessary to maintain a 1.3 m th water pressure.

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