

Technology of Irrigation of Agricultural Crops with Water of Different Quality

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ABSTRACT: The total area of irrigated land in the Khorezm region is 276.5 thousand hectares. Cotton, winter wheat, rice and many other agricultural products are produced here annually. At the same time, it should be noted that there are some disadvantages in the use of irrigation water. Against the background of acute shortage of water resources, the average water supply per complex hectare of irrigated land for the annual cycle exceeds the average indicators for the Amu Darya basin.

KEYWORD: irrigated lands, cotton, yield, phenological observations, agricultural engineering, water scarcity.

INTRODUCTION

A brief history of development. Uzbekistan is one of the oldest areas of development of irrigated agriculture in the world. According to the research of famous historians and archaeologists V. Bartold, A. Yakubovsky and others, the construction of canals here was started in the middle of the second millennium BC.

The initial agriculture was based on natural river flooding, and then on delta channels, from which water was taken into irrigation channels. For example, the Khorezm oasis, where artificial irrigation was developed, was called by the ancient Chinese - "Kangui", i.e. the edge of the canals. Ancient Greek historians also note that in the III-II centuries there were large irrigation canals around Tashkent. Arab geographers also wrote about this – in the state of Shash (Tashkent oasis) there were 50 settlements drowning in gardens and vineyards, some, such as Biskent (Piskent), Farekent (Parkent), Zarekent (Zarkent) have survived to this day.

The largest scientific and technical achievement in the development of irrigation on the lands of ancient Uzbekistan at the beginning of the XX century was the creation of a dual-use reclamation system, which, in the conditions of the middle and lower reaches of rivers, having buried channels, were used for irrigation by raising water to the fields with various water-lifting devices - "chigiri", and during the period of irrigation cessation served as a drainage system systems, limiting the rise of the groundwater level and reducing the intensity of soil salinization.

In the subsequent period, the organization of irrigation and reclamation works in accordance with the needs of the economy of the former Soviet Union provided for the enlargement of irrigation plots with bringing them to sizes that allow the most efficient use of agricultural machinery and other machines, rebuild the irrigation network on a new technical basis and create a large number of irrigation systems of engineering type to increase the water availability of old and the development of new irrigation lands.[5]

Intensive development of new lands, major shortcomings in natural resource development projects, primarily water and land resources, led to an increase in water scarcity, deterioration of irrigation water quality in the middle and lower reaches of the Amu Darya and Syr Darya rivers, aggravation of the ecological situation in the Aral Sea areas and the drying up of the Aral Sea.

The development of irrigation in the previous period, with the non-economical use of irrigation water, made certain changes in the natural reclamation situation, contributed to the rise of the groundwater level in large areas. In the conditions of the arid zone (to which Uzbekistan belongs), this phenomenon has led to an increase in salinity and a decrease in land productivity. In order to prevent a negative impact on land productivity, the construction and reconstruction of horizontal and vertical drainage systems was carried out. The presence of saline lands in the Republic (about 50% of the irrigated fund) is due to both the development of naturally saline (and partially initially saline) massifs and secondary salinization caused by the rise of mineralized groundwater.

The irrigated territory of the Khorezm region is located on the lower reaches of the Amu Darya. In dry years there is a shortage of irrigation water. Therefore, based on the conducted experiments, it is proposed to apply the method of subirrigation, i.e. the joint use of surface and groundwater when watering cotton, winter wheat and other crops. Partial compensation of moisture deficiency is made by raising groundwater to the level of the root system. At the same time, it is proposed to use groundwater of a certain mineralization, depending on specific climatic and soil-reclamation conditions.

Introduction. The total area of irrigated land in the Khorezm region is 276.5 thousand hectares. Cotton, winter wheat, rice and many other agricultural products are produced here annually. At the same time, it should be noted that there are some disadvantages in the use of irrigation water. Against the background of acute shortage of water resources, the average water supply per complex hectare of irrigated land for the annual cycle exceeds the average indicators for the Amu Darya basin.

Despite the fact that the average irrigation water consumption for obtaining one hundredweight of raw cotton is 675.7 m³, and wheat is 430.2 m³, the yield of these main crops remains at a low level. The latter is explained by the fact that in the area of slightly saline lands 128.39 thousand hectares, medium saline 96.29 thousand hectares and strongly saline 33.15 thousand hectares.

The transition to the basin principle of irrigation systems management, the organization of water user associations significantly smoothes the problems associated with the shortage of water resources and the deterioration of the land reclamation condition. However, many more reserves for increasing the water availability of irrigated agriculture are not sufficiently involved. In particular, an effective irrigation method used since ancient times in the Khorezm oasis and now forgotten as subirrigation is the joint use of surface and groundwater when watering cotton, winter wheat and other crops. The method of subirrigation can give a tangible return only with an appropriate scientifically based irrigation regime.

Therefore, the goals and objectives of these studies include the development of water-saving regimes and technologies for cotton irrigation for specific climatic and soil-reclamation conditions, the boundary of which is outlined by the representativeness of experimental data in relation to the production situation.

Farmers should possess an effective tool for safe farming in conditions of limited water resources and unfavorable ecological and meliorative condition of the lands of the lower reaches of the Amu Darya.

Pilot production research. The review of publications on the features of irrigation of agricultural crops in the conditions of the Khorezm region and similar conditions showed that at a groundwater level of 1.0-1.5 m and mineralization of no more than 2 g/l in the total water consumption of the cotton field, the share of groundwater use is up to 60%. This allows us to conclude that it is advisable to use irrigation and groundwater together during irrigation (subirrigation) in separate phases of vegetation of agricultural crops.

Research results. According to field measurements, the volume mass of the soil from the initial 1.41-1.53 g/cm³ increased to 1.44-1.56 g/cm³ in the control area, and where subirrigation was used, it tended to gradually decrease from 1.41-1.53 g/cm³ to 1.39-1.47 g/cm³

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