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HYDROMODULE ZONE OF IRRIGATED LAND OF SOUTH KARAKALPAKSTAN

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Abstract. One of the main directions for the further development of irrigated agriculture in the basin of the Aral Sea rivers is to increase the productivity of scarce irrigation water through the development and implementation of water-saving regimes and technologies for irrigation of agricultural crops that meet environmental requirements, contributing to an increase in the fertility of irrigated lands, obtaining a high early ripening crop yield. The article presents the results of research on hydro modular zoning of irrigated lands based on GIS technologies, as well as cotton irrigation regimes in the conditions of South Karakalpakstan.

Keywords: Climate change, water scarcity, cotton, irrigation regime, drip irrigation, irrigation rate, seasonal irrigation rate, productivity, soil, water-physical properties of soil, groundwater, salt regime, reclamation, efficiency, water economy.

1. Introduction.

In the world, global climate change is becoming a factor that can have a significant impact on all areas of human activity. It has a negative impact on the environment in many parts of the planet, on the lives and health of the population in various sectors of the economy. The impact of climate change on agriculture in particular is high, as agriculture is one of the most weather-dependent sectors of the economy. Climate change will lead to 10-15% evaporation of water from water surfaces, and 10-20% more water consumption due to increased plant transpiration and irrigation standards. This leads to an average 18% increase in non-renewable water consumption. Assessing the possible increase in water consumption on irrigated lands due to climate change (water consumption of various crops, losses, changes in land reclamation) is a topical issue today.

The purpose of the study. Hydromodule zoning of irrigated lands in the southern districts of the Republic of Karakalpakstan in the context of climate change and water scarcity, creation of electronic maps of hydromodule zoning by districts using modern GAT technology, development of science-based irrigation regime for cotton in the main hydromodule region.

Extensive research has been conducted in the southern, central and northern regions to determine the irrigation system of cotton varieties, and has made appropriate recommendations to determine the irrigation regime of cotton depending on soil climatic conditions.

Z.A. Artukmetov., H.Sh. Sheraliev. Groundwater in the northern climate zone is 800-1000 m3 / ha once in the relatively early periods before the cotton flowering phase in moderate and heavy sandy-gray soils located in the depths (3-4 m), 600-800 m^3/2 times in 14-16 days in light sandy soils. ha watered in moderation: the first watering was carried out when the plant has 3–4 leaves, and the second watering was carried out during the period of weeding.

In heavy sandy soils of the southern region of the Republic of Karakalpakstan at a depth of 2-3 m, cotton is irrigated 5 times in the 2-3-0 system at a total rate of 5100 m^3/ha. in sandy and heavy sandy and loamy soils in the 1-3-0 system is irrigated at a total rate of 3400-4400 m^3/ha, respectively. Due to the proximity of groundwater to the surface, such lands are not irrigated during the ripening period. Periodic rate of irrigation is 800-1200 m^3/ha. formed.

According to F. Gopporov's research, in 2018-2019 the fields of cotton growing in Tashkent region (Akkavak) will be irrigated from the old, the groundwater is 18-20 meters, the salinity is not salty, the mechanical composition is medium-heavy sandy soils. application of mineral fertilizers (NPK) in the amount of 225: 157.5: 112.5 kg/ha for cotton growing and plant growth and development and dry mass accumulation at 70-75-65% pre-irrigated soil moisture relative to limited field moisture capacity were found to be higher than other options.

Located on the lower banks of the Amu Darya, the natural climatic conditions of Karakalpakstan differ significantly from other regions of Central Asia. Consequently, the weather on the lower banks of the Amudarya is sharply continental, dry. In it, the daily temperature of the summer season makes the air always clear. The winter season in the region is much cooler than in other regions of Uzbekistan. Annual precipitation in different regions of the region is not the same: around 80 mm in the south, 110 mm per year in the north, mostly in the spring, the level of evaporation on the soil surface increases by 12-15 times the annual volume.

Table 1. Temperature, relative humidity, wind speed and precipitation in the Republic of Karakalpakstan.

(Data from the Nukus Monitoring Center for 2014-2018)

Indicators	Unit of measurement	Quantity
1. Evaporation rate	mm	1200-1300
2. Precipitation	mm	90-120
3. Average monthly temperature	^0C	10-12
4.Maximum temperature	^0C ^0C	+45 -30

The research was carried out on the irrigated lands of Reimbay Boshliq farm in Beruni district. Collector-drainage networks have been built on the lands of all farms, irrigation networks have engineering features. To irrigate agricultural crops, water is delivered to the fields through ditches and canals, and the crops are irrigated. The soil of the farm is weak and moderately saline. In the experimental field, research was conducted based on the following system. (Table 2):

Table 2. Field experiment system

#	Soil moisture before irrigation, in% of the limited field moisture capacity	Irrigation norm, m^3/ha
1	Production control	Actual measurements
2	70-70-60	On the moisture deficit in the layer of 70–100–70 cm
3	70-80-60	
4	70-80-60	Moisture deficit in the 70-100-70 cm layer was increased by 30%.

The following observations and analyzes were made in the cultivation of cotton in the experimental field:

- The soil conditions of the experimental field were studied. To do this, before sowing the seeds in the experimental field was excavated a layer of soil to the depth of groundwater, samples were taken from the genetic layers of the soil section, and in the laboratory its mechanical composition, nutrient content (humus, nitrogen, phosphorus and potassium) and soil salts were determined;

- the volumetric weight of the experimental field soil was determined annually at the beginning and end of the growing season, using a steel cylinder with a height of 10 cm, in layers of 0-100 cm;
- the water permeability of the experimental field soil was determined annually at the beginning and end of the growing season on a cylindrical circle based on the Nesterov method;
- the field moisture capacity of the experimental field soil was determined before the start of the field experiment by the Rozov method by filling a 2x2 m area with 2000-3000 m^3 of water every 10 cm to a depth of 0-100 cm;
- The depth and mineralization of the experimental field groundwater level were studied.

Before and after each irrigation, samples of groundwater were taken from observation wells using special equipment, and the amount of salts in the laboratory was measured using a conductometer. Groundwater level depths in observation wells were measured every 10 days;

- changes in soil moisture of the experimental field were detected at the beginning and end of the growing season to the groundwater level, before and after irrigation (day 3) at a depth of 0-100 cm in a digital laboratory instrument measuring moisture;
- Water consumption in the experimental field was measured using a water meter "Chippoletti" (0.50 m) and calculated according to the table;
- to determine the degree of salinity of the soil of the experimental field in all variants of the experiment was determined using a conductometer at the beginning and end of the growing season at every 0-10 cm of the 0-100 cm layer of soil;

While plant development and productivity are related to soil fertility, plants also affect soil composition. Depending on the farming culture, its fertility will also change after the soil begins to develop from its natural state through the cultivation of agricultural crops. Improving soil fertility depends on 4 main factors: reclamation status, mechanical tillage, fertilization and the type of plant to be planted. The plant improves as much water-air and nutrient regimes as possible in the soil during the growing season and leaves a certain amount of organic matter in the soil after it. However, chronic planting of one crop in a certain area does not have a positive effect, on the contrary, it reduces soil fertility, so intensive farming should be used in the cultivation of each crop based on a rotation system, irrigation and optimal use of fertilizers.

The soils of the experimental fields have been irrigated meadow alluvial soils since ancient times, and the groundwater is located close to the surface (2-3 m). Soil formation processes take place under the influence of groundwater.

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CONTENTS