

## **FEATURES OF WATER CONSUMPTION OF COTTON ON IRRIGATED LANDS OF KARAKALPAKSTAN**

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### **Abstract**

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In article is considered total water consumption cotton plant depending on soil-meliorations' of the zone, mechanical composition of ground in layer of the aerations and constructions, adding soil of water, level soil of water and their mineralization.

The Republic of Karakalpakstan is located north of the area of world cotton production. In relation to climate of the region refer to the desert zone. Annual precipitation is 80–100 mm, and the total evaporation is 10–12 times greater than precipitation. Therefore, under these conditions, agriculture is based solely on artificial irrigation. It is therefore necessary to determine the components of the water balance equation soils under cotton.

The results of research conducted on the 2009–2014 in farm “Kuat” Chimbay region suggests that the total water consumption of cotton fields depends on the depth of groundwater. Lowering of the groundwater causes the flow of irrigation water increases. The main incoming part of the water balance in soils automorphic series (GWL < 3 m) of irrigation water, less importance rainfall and soil moisture created is not growing season.

The total water consumption of cotton on irrigated soils is automorphic series – 6790 m<sup>3</sup>/ha. The share of irrigation in total water consumption norms cotton field is 58.9%, soil moisture, 34.4%, and 6.6% of precipitation. Transpiration expended 65.5%, evaporation from the soil surface of 40.3%.

*Key words:* Cotton, plant, sort, zones, ground, automorphic, semihydromorphic, hydromorphic hydro morph, soil of water, mineralization, precipitation (draft), watering, evaporation, transpirations, farmer, receipts, consumption, water consumption

### **Introduction**

The Republic of Karakalpakstan is located north of the area of world cotton production. In relation to climate of the region refer to the desert zone. Annual precipitation is 80–100 mm, and the total evaporation is 10–12 times greater than precipitation. Therefore, under these conditions, agriculture is based solely on artificial irrigation. It is therefore necessary to determine the components of the water balance equation soils under cotton.

Bodies of Water and Agriculture of the Republic of Karakalpakstan is currently with the modes of irrigation and wa-

ter consumption of cotton, compiled by experts from Soviet Union scientific research institute of cotton growing 1985. Naturally, the last period in the agriculture of the republic there have been major changes in agriculture, creating farms, organized by the Council of the water users. Tip farms. Similar changes are implemented in the water sector. Change the boundaries of the farm were replaced by varieties of cotton and others. Currently, in some cases, cotton irrigation has been driven without deep soil reclamation area specific fields of farming, without the involvement of the entire research work. Therefore, the development of evidence-based total water consumption and irrigation system is the most specific

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for cotton farming, a new stage of the introduction of science into production.

## Materials and Methods

Field experiments were conducted and production for 2009–2014 years on an experimental base of the Karakalpak Scientific-Research Institute of Agriculture and farms “Kuat” Chimbay area with different soil-reclamation conditions.

The methodological bases for the solution of the main objectives were: the method of field experience, as well as the calculation method developed by Bespalov (2007) method of field trials on saline lands. Soil-reclamation zoning as a target method of determining irrigation norms and regimes developed by our research to farming the Southern Aral Sea.

Field experiments with different varieties of cotton becoming the main Task- establish the optimal mode of pre-irrigation moisture of the soil and the settlement of various wetting layer on the cotton yield by the method according to the Ryzhov (1998).

The experiments were performed according to the method of furrow irrigation and the use of mobile irrigation tray 50 (MIT-50).

Agro, agro-chemical and microbiological properties of the soil was determined by the method UzSRICG (2007). Field experiments were conducted and production for 2009–2014 GG on an experimental base of the Karakalpak Scientific-Research Institute of Agriculture and farms “Kuat” Chimbay area with different soil-reclamation conditions.

## Results and Discussions

The results of research conducted on the 2009–2014 years in farm “Kuat” Chimbay region suggests that the total water consumption of cotton fields depends on the depth of groundwater. Lowering of the groundwater causes the flow of irrigation water increases. The main incoming part of the water balance in soils automorphic series (GWL < 3 m) of irrigation water, less importance rainfall and soil moisture created is not growing season.

The total water consumption of cotton on irrigated soils is automorphic series – 6790 m<sup>3</sup>/ha. The share of irrigation in total water consumption norms cotton field is 58.9%, soil moisture, 34.4%, and 6.6% of precipitation. Transpiration expended 65.5%, evaporation from the soil surface of 40.3%. (Table 1). The dependence of the total water consumption of cotton on semihydromorphic and hydromorphic

**Table 1**

**Total water consumption of cotton on automorphic soils (average 2012–2014)**

Receipt and expenditure of the water	m <sup>3</sup> /ha	%
Receipt		
Precipitation	450	6.6
Glaze	4000	58.9
The use of soil moisture in	2340	34.4
Total	6790	
Expenditure		
From the soil surface in	2740	40.3
Transpiration	4050	65.5
Total	6790	

soils depends on the nature of the soil-ground structure in the vadose zone in texture.

Irrigated semihydromorphic (GWL 2–3 m) of land in texture in the vadose zone easily and medium loamy, loamy, facilitates downward soils total water consumption totals – 7824 m<sup>3</sup>/ha, 28.5%, ground water, 31.5% of soil moisture and irrigation water and irrigation water 35.7%. Precipitation only accounted for 4.0% (Table 2).

**Table 2**

**Receipt and expenditure of the water on a cotton field semihydromorphic and hydromorphic soils**

Receipt and expenditure of the water	m <sup>3</sup> /ha	%
Semihydromorphic soil, average 2012–2014		
Receipt		
Precipitation	320	4.0
Glaze	2800	35.7
Soil moisture in	2470	31.5
Groundwater in	2236	28.5
Total	7826	
Expenditure		
The soil surface in	2148	27.4
Transpiration	5678	72.5
Total	7826	
Hydromorphic soils. Average 2009–2011		
Receipt		
Precipitation	270	3.7
Glaze	1855	25.9
Soil moisture in	2340	32.7
Groundwater in	2679	37.5
Total	7144	
Expenditure		
The soil surface in	2932	41.0
Transpiration	4212	58.9
Total	7144	

**Table 3**  
**Groundwater use cotton**

Ground	Mechanical composition, structure and composition	Use of either groundwater, %	Mechanical composition, structure and composition	Use of either groundwater, %
Semi-hydro-morphic (GWL-2-3 m)	light and medium loam, uniformity, heavy-loamy Overlying down	40–45	Loam different mechanical layered composition	15–20
Hydro-morphic (GWL-1-2 m)	light and medium loam, more uniform, heavy-loamy slinky down	60–65	Loam different mechanical layered composition	25–30

The lowest rate of irrigation of cotton is observed in irrigated areas of hydromorphic series (GWL-1-2 m) in texture light and medium loam, heavy, tight bottom. Depending on the depth of groundwater and soil-ground nature of the addition-textured loamy and clayey, different-textured, layered soils, groundwater use, accounted for only 15-30%.

Groundwater flow is also dependent on the biological characteristics of different varieties of cotton, the potential transpiration and character placement of the root system. Special studies have shown that more evenly placed and penetrate to a greater depth of soil in the root system of cotton varieties “Dustlik-2”, than in the variety “Chimbay-5018.”

Generalization of a large number of special studies in the field and lysimeters conducted in various soil-reclamation conditions of cotton seeds, have allowed to establish the specific consumption of groundwater evapotranspiration moisture irrigated field (Table 3).

On soils layered in texture total irrigation norm cotton field increases, mainly reducing the flow of groundwater.

The lowest rate of irrigation of cotton is observed in irrigated areas of hydromorphic series (GWL-1-2 m) in texture light and medium loam, heavy, tight bottom. Depending on the depth of groundwater and soil-ground nature of the addition-textured loamy and clayey, different-textured, layered soils, groundwater use accounted for only 15–30%, depending on the depth of groundwater in the country for 80% of the total area irrigated area developed hydromorphic soils and semi-hydromorphic series with a shallow (1.0–3.0 m), shallow water table.

## Conclusions

The total water consumption of cotton on irrigated soils automorphic series at harvest 3.0 t/ha were – 6790 m<sup>3</sup>/ha.

While the share of irrigation rate in total water consumption is 58.9%. Soil moisture is 34.4% and atmospheric moisture – 6.6%. Transpiration expended – 65.5%, evaporation from the soil surface is 40.3%.

The share of consumption of groundwater in the total water consumption of cotton fields, depending on the physical properties of water and soil in the bed aeration is: at a depth of 2–3 m of groundwater in a homogeneous, light soils, 40–45%, with a depth of groundwater 1–2 m – 60–65%. Under the conditions of heavy-layered soil and groundwater at a depth of 2–3 m, 15–20%, at a depth of 1–2 m groundwater – 20–25%.

Consumption of groundwater should be considered, therefore, that the farm Republic of Karakalpakstan 80% of the total area of irrigated area developed semi-hydromorphic and hydromorphic soil series with a shallow (1–3 m) groundwater table. In some administrative areas (Kegeyli, Chimbay et al.), almost all the irrigated area is represented by such soils.

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