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SOIL AND CLIMATIC CONDITIONS OF SURKHANDARYA

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Abstract:

In the area considered in the article, valuable fine-fiber varieties of cotton are successfully cultivated. However, it should be noted that high yields of fine-staple cotton can be achieved only if high agricultural technology is observed, the rational use of fertilizers and irrigation regimes.

Keywords: Valuable fine-fiber varieties of cotton, soil climatic conditions, Surkhandarya

Irrigated regions of Uzbekistan are distinguished by a variety of soil climatic conditions. The Republic of Uzbekistan is divided into two vast climatic zones: desert and semi-desert. The experimental work was carried out at the Surkhandarya experimental station located in the desert soil-climatic zone.

Surkhandarya region occupies the extreme southern position within Uzbekistan. The region is separated from the eastern and northern parts of Central Asia by a system of mountain ranges. The best air currents contact is from the west and south. All this determines the specificity of the region's climate. At the same time, the natural conditions within the region are very diverse. There are regions with a mountainous, semi-desert climate [1].

According to the adopted scheme of soil-climatic zoning within the boundaries of the Surkhandarya region, belts are distinguished: light-brown alpine soils, mountain-brown soils, gray soils (dark, typical, light) in the system of vertical zoning and an arid zone in the system of latitudinal zoning.

Against the general background of vertical latitudinal zonation of soils, the quality and agricultural production properties of lands have significantly changed under the influence of natural and technological factors of human impact on the soil. This, in general, determines the variety of soil-forming processes and the formation of soils, different in genesis and agricultural production characteristics. Below is a systematic list of soils in the area [2-4].

I. SOILS OF THE DESERT ZONE

1. Gray-brown - 50.7 thousand hectares, incl. irrigated 11.5 thousand hectares
2. Takyr-like - 148.2 thousand hectares - "- 41.7
3. Takyr-meadow 16.5 thousand hectares - "- 12.9
4. Sandy desert - 68.0 thousand hectares - "- 9.8
5. Meadow and swamp-meadow 48.8 thousand hectares - "- 28.9
6. Salt marshes 8.4 thousand hectares

II. SOILS OF THE MOUNTAIN-FOOTHILL ZONE

7. Light brown meadow-steppe - 173.8 thousand hectares
8. Brown - 370.7 thousand hectares
9. Dark gray soils - 180.6 thousand hectares, incl. irrigated 1.9
10. Typical gray soils - 404.5 thousand hectares - "- 41.6
11. Light gray soils - 345.1 thousand hectares - "- 38.4
12. Meadow-gray soils - 27.8 thousand hectares, incl. irrigated -27.8
13. Meadow and swamp-meadow - 29.7 thousand hectares - 29.3
14. Other education - 137.1 thousand hectares

Total in the region - 2009.9 thousand hectares - "- 243.8

Naturally, each of the zones is characterized by its own set of soils and the originality of negative factors that adversely affect their fertility. In the desert zone, the negative factors include salinity and wind erosion on light-textured soils. In gray-brown soils, gypsum horizons have a negative effect on productivity both by their chemical and mechanical properties, and by surface deformation as a result of uneven dissolution and removal of gypsum. The impact of agrotechnical measures, fertilizers, crop rotations, etc. on these soils gives a positive effect only after reclamation work to eliminate negative factors (salinity, gypsum content, wind erosion).

According to A.B., Rudometov (1949), the annual range of average daily temperatures is 25-28 ° C. The absolute maximum in summer reaches 23.5-46.9 ° C, in winter the absolute minimum temperature drops to 20-23 °, in the southern regions of the region there is an insignificant amount of precipitation 130-160 mm per year, the relative humidity in summer is very low, in some months drops to 18-20%. The frost-free period lasts 226-227 days in Denau and Kumkurgan, 234 days in Termez and 266 days in Sherabad. The first autumn frosts occur on November 2-24 (in Termez and Sherabad), in Termez the last spring frosts end on March 2-12. The sum of effective temperatures with a lower limit of 10 ° in Termez is 3306 ° C, which is higher than any point located in other regions of Uzbekistan.

According to the Sherabad and Termez meteorological stations, the average long-term temperature ranges from 17.3-17.8 ° C, the average monthly temperature during the growing season of plants is 26.1-26.2 ° C. The absolute minimum air temperature in June is 31.2-31.9 ° C, the absolute maximum temperature is 48 ° C. The transition from winter to spring is very fast. If in February the temperature is 5-6 ° C, then in March it reaches II, 3 ° C, and in April 17.7-18.5 ° C (L.N.Babushkin, 1957).

The increase in air temperature begins in March, April, reaches a maximum in July. During the years of our research, especially warm weather was noted in 2014, when the air temperature in April was 21.2 ° C, and in 2012, 2013 and 2015, respectively, 20.6, 20.3 and 18.4 ° C (Table 3.1.I).

Annual	Non-vegetation season							Vegetation period							Average annual temperature	The amount of precipitationза год
	X	XI	XII	I	II	III	Monthly average	IV	V	VI	VII	VIII	IX	Monthly average		
Air temperature																
2012	17,9	7,9	8,6	3,0	5,6	9,9	8,8	20,6	24,5	28,9	30,5	27,4	23,3	25,8	17,34	-
2013	18,7	10,2	8,1	4,1	7,2	10,9	9,8	20,3	21,3	28,3	30,6	27,9	23,0	25,1	17,46	-
2014	16,8	13,3	10,0	2,9	5,1	11,2	9,9	21,2	25,8	28,7	30,1	27,7	24,2	26,3	18,25	-
2015	14,9	10,3	8,1	5,9	7,5	14,2	10,1	18,4	24,6	31,0	30,4	27,3	22,3	26,0	17,90	-
Average for 4 y.	17,1	10,4	8,7	4,0	6,3	11,5	9,6	20,1	24,0	30,4	30,4	27,6	23,2	25,8	17,74	-
Precipitation, mm																
2012	-	24,9	9,9	29,3	6,1	47,1	19,55	28,1	7,6	-	-	-	-	5,95	-	153,0
2013	-	5,3	12,7	27,5	18,4	37,6	16,91	16,1	12,3	2,1	-	0,4	-	5,15	-	132,4
2014	0,4	5,3	-	39,5	24,1	53,5	20,46	28,3	1,7	-	-	-	-	5,0	-	152,8
2015	3,2	0,9	13,4	22,0	18,4	26,8	14,11	24,6	3,1	-	-	-	-	4,61	-	112,4

Atmospheric precipitation was distributed unevenly throughout the year, with a relatively large amount of precipitation in February, March and April. They almost never happen in June, July, August and September. For the period 2012-2015 the amount of precipitation was completely different both over the years and in comparison with the long-term average. The largest amount of precipitation fell in 2012 and 2014, and the least - in 2015.

In the Surkhandarya region, where mainly fine-fiber varieties of cotton are cultivated, strong southwest winds blow, causing dust storms called "Afghans", reaching great force in open places. After the wind subsides, the air temperature drops by 2-3 ° C. Most of them blow in spring and summer. In spring, these winds quickly dry up the arable layer of soil, which leads to forced recharge irrigation. In summer, winds also sharply reduce air humidity, increase evaporation and transpiration of plants, and cause the fall of fruit elements. Soils of the south of the Surkhandarya region (A.V. Gnusov, B.V. Gorbunov, N.V. Kimberg, I960), where irrigated crops are cultivated,

hydromorphic, gray-brown, desert, sandy, takyr-like, gray soils and sands (Jarkurgan district), takyr, irrigated, meadow, desert zones (Sherabad, Termez districts).

The morphological feature of takyrs is the soil surface covered with fissured crust. In takyr soils, the crust is weak, easily breaking up to 1 cm thick; looser structural dry horizons lie under the crust. The soil profile is short, up to 30-50 cm. Sometimes in solonetzic varieties of takyr soils, a dense blocky horizon of brownish tones is developed under the crust, usually the profile of takyr soils is gray, monotonous. In terms of texture, takyr soils and takyrs of the described region are classified as clayey and loamy varieties. They are developed mainly on clay-loamy layered proluvial deposits in the upper part of the Sherabad cone, underlain by pebbles. In this part of the region, takyr soils, being well drained, are not subject to salinization. In the rest of the south of the Surkhandarya region, the takyr soils are saline (LN Babushkin, 1961). Desert in sandy soils and sands (Jarkurgan region), the upper horizon of desert, sandy soils is loose, only in places with fragile sod. The next horizon of compacted content, consisting mainly of silty and silty fractions. Desert sandy soils, due to good water permeability, are almost not saline, but on the other hand, due to their light mechanical composition, they are low-humus (0.3-0.4%), poor in nitrogen. Takyr soils and takyrs are poor in organic matter. In virgin soils, the humus content will slightly exceed 0.5%. As for the content of total phosphorus, takyr soils and takyrs differ little from gray soils. With cultivation, the amount of humus in the soil increases, reaching 1.2-1.5% in irrigated soils. Takyr soils are distinguished by poor physical properties, therefore, it is very important, especially at the beginning of the development of takyr soils, to improve their physical condition. Here, crop rotation and organic fertilization are of particular importance.

In the studies of the past years, the soils of this region are classified as irrigated takyr soils with deep groundwater. Recently, the hydrogeological situation in the area has changed significantly. This is facilitated by the construction of the Uch-Kyzyl reservoir, from which water is constantly being filtered to the territory located below. Filtration of water on unlined canals and irrigation ditches, as well as from fields, has also increased due to an increase in water cut. All this led to a sharp rise in the level of groundwater in the territory of the Uch-Kizyl reservoir. In this regard, on the territory of the experimental station, groundwater has significantly approached the soil surface. The rise in the level of groundwater causes moistening of the soil, causing the formation of hydromorphic soils.

To characterize the soil of the experimental station, V. Valiev and N. Malabaev, under the guidance of P.N. Besedin (1967), laid soil sections with a depth of 1-2 m to the groundwater. Their research showed that the soils of the experimental station belong to meadow-desert. However, the meadow process here is not long ago, in connection with which the soils should be considered as meadow of the initial stages of formation.

In general terms, the profile of takyr meadow soils has the following structure: arable horizon 0-29 cm of light gray color, sometimes with a brownish tint. The sub-arable horizon is 30-40 cm, brownish-light gray in color, more compacted than the arable one. This is followed by a brownish-gray, often rusty bloom, a compacted, moist horizon, smoothly changing down the profile. Fragments of pottery are often found in the subsoil and less often in the lower horizons. As can be seen, the profile of the described soils has a monotonous, gradual changing structure. No new formations of carbonates were observed in the profile. In terms of texture, meadow soils are medium loamy in the arable and subsoil horizons (Table 3.1.2).

Mechanical composition of the experimental plot,% on dry soil

Table 3.1.2

Depth, sm	Fraction sizes, mm								
	1-0,25:0,25-0,1:0,1-0,05:0,01:0,01-0,005:0,005-0,001:<0,001: mechanical <0,01: structure								fraction:
0-29	0,17	3,67	19,29	44,83	9,68	10,95	15,23	35,88	Medium loam
30-40	0,14	3,68	19,91	44,04	8,65	10,62	12,96	32,23	-"-
50-60	0,17	2,06	12,44	51,67	9,82	10,08	13,76	33,66	-"-
80-90	0,25	1,11	9,47	53,41	11,28	11,92	12,61	35,81	-"-
100-110	1,30	1,33	12,61	56,01	9,41	9,00	10,34	28,75	-"-

Agrochemical characteristics of the experimental site

Table 3.1.3

Depth, sm	Gross,%							Mobile forms, mg / kg	
	Humus: nitrogen: phosphorus: potassium: C: N: nitrogen: phosphorus: potassium: CO2								
0-29	1,224	0,083	0,163	2,127	8,5	8,2	20,0	330	9,1
30-40	0,748	0,063	0,148	2,089	6,9	5,9	7,5	200	8,1
50-60	0,663	0,057	0,110	2,082	6,7	3,6	Сл.	200	8,0
80-90	0,642	-	-	-	-	-	-	190	8,5
100-110	-	-	-	-	-	-	-	-	8,2

The bulk of the mechanical elements are dust fractions with small values of the sand fraction and almost complete absence of coarse sand. The muddy fraction in most cases is expressed in significant values.

From the data table. 3.1.3 it can be seen that the soils are characterized by a relatively low humus content in the arable soil layer of 1.224%. The humus content along the profile of the section deserves special attention. Deep penetration of organic matter into the lower horizons is observed. Even at a depth of 80-90 cm, about 0.7% of organic matter was found. This is evidently connected with the considerable prescription of irrigated agriculture in this area, which led to the cultivation of soils. As you know, Termez is one of the most ancient cities of Central Asia and irrigated agriculture has been carried out here for a long time, as evidenced by the monotonous color of the profile, the presence of fragments of pottery, etc. The thickness of the soil layer and the presence of a significantly agro-irrigation horizon were noted back in 1928 by A.N. Rozanov. The nitrogen content and its distribution along the profile are in accordance with the amount and distribution of humus. An increase in the content of organic matter in the course of long-term irrigated agriculture was accompanied by an increase in the stock of total nitrogen in the soil, which is evident from the ratio of carbon to nitrogen.

With rather high values for humus and total nitrogen, the content of total phosphorus in the soils of the arable horizon is expressed in small values - 0.163%. The distribution of phosphorus along the profile is typical for irrigated soils. One of the general indicators of the soils of the experimental station is a high carbonate content of CO2 in them, 8.0-9.1% of the weight of the soil, and they are distributed quite evenly along the profile.

The results of the analysis of the water extract indicate that the soils of the experimental station are not saline, the dense residue and the content of HCO3 characterizing the total alkalinity of the water extract varies between 0.097-0.192% and 0.026-0.024%. Also in the range of 0.10-0.014% of the non-toxic value is the content of chlorine-ion in soils (Table 3.1.4).

Composition of water extract of takyr-meadow soil,%

Table 3.1.2

Depth, sm	Dense residue	HCO_3	Cl
0-29	0,192	0,024	0,010
30-40	0,180	0,026	0,008
50-60	0,097	0,026	0,010
80-90	0,165	0,029	0,014
100-110	0,135	0,029	0,012

Thus, in the considered zone, valuable fine-fiber varieties of cotton are successfully cultivated. However, it should be noted that high yields of fine-staple cotton can only be achieved if high agricultural technology is observed, the rational use of fertilizers and irrigation regimes.

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