Physical and Mechanical Properties of the Soil of the Bukhara Region Republic of Uzbekistan

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ABSTRACT

A brief description of the soils of several regions of the Republic is given. Uzbekistan and experimental data on the characteristics of soil moisture and hardness during the main processing period.

Keywords: Deep processing, irrigated soils, meadow soils, humus, zone, soil moisture.

The system of measures aimed at agricultural reform plays a key role in the implementation of economic reforms in Uzbekistan. Decree of the President of Uzbekistan No. PQ -2460 of December 29, 2015 “On measures to further reform and develop agriculture in 2016-2020”, No. PQ-3117 of July 7, 2017 “On measures for the further development of scientific and technical bases of agricultural engineering”, adoption of the Decree of the Cabinet of Ministers of the Republic of Uzbekistan dated July 14, 2012 No. 215 “On measures to ensure the implementation of the program for further modernization, technical and technological re-equipment of agricultural production for 2012-2016”, which ultimately leads to systemic reforms, aimed at the development of agriculture.

The development of cotton growing in the independent Republic of Uzbekistan should be based on the development and implementation of new agricultural machines and tools that perform technological processes at a high level with low energy intensity and the lowest cost.

The possibilities of increasing cotton production by increasing the sown area in most cotton-growing regions of the republic have been exhausted, and irrigated areas per capita are decreasing. Under these conditions, the only way to increase agricultural production is the intensification of agriculture, increasing the fertility of developed lands, and involving the "second virgin lands" - subsoils in agricultural circulation /I/.

Engaging these resources through deep cultivation is one of the important tasks in irrigated agriculture in cotton-growing areas.

During cultivation and harvesting, machines and aggregates make multiple passes through the cotton field, because of this, the arable and subsurface layers are excessively compacted, it is difficult for irrigation water, nutrients (nitrogen, phosphorus, etc.), and cotton roots to penetrate into the lower layer. In addition, under these conditions, microbiological processes worsen, consequently, soil fertility decreases.

Thus, dense subsurface layers on vast areas of old irrigated lands of the cotton-growing zone are not fully involved in the creation of the raw cotton crop /I/. The yield of cotton is reduced to 40% with a significant increase in labor and material costs. To increase the production of raw cotton, many researchers recommend deep (more than 40 cm) loosening of compacted subsoil layers. This agrotechnical technique makes it possible to reduce water erosion, prevent secondary salinization of irrigated lands to some extent, create favorable water-physical and microbiological conditions, nutrient and air regimes that ensure a powerful and deep development of the cotton root system, i.e. contributes to the increase in the yield of raw cotton.

Long-term agrotechnical experiments carried out in the advanced farms of Andijan, Bukhara, Syrdarya, Jizzakh regions showed that periodic (once every 2-3 years) deep loosening of the subsoil layer to a depth of 50 ... 55 cm in combination with two-tier plowing to a depth of 30 cm provide an increase in cotton yield from 2 to 5 c/ha.

Of the total area of irrigated soils in Central Asia, about half belong to the gray earth, the other to the meadow. Soil-forming rocks of sierozems are mainly represented by loess-leaching sediments. Serozems are characterized by a low content of humus (0.5...3%), high carbonate content, saturation of the absorbed loess complex with alkaline earth bases, as a result of which they have a weakly alkaline reaction. The low content of humus in irrigated soils causes the instability of soil aggregates to the eroding action of irrigation water. However, due to the high carbonate content and biological activity, these soils have a high microaggregation, which makes them water and air permeable.

Meadow soils differ from serozems by a slightly higher content of humus, especially in the upper layers. In the middle and lower parts river valleys, these soils are prone to salinization, then the cultivation of cotton is associated with preliminary leaching irrigation. One of the distinguishing features of meadow soils is the presence of a gleyed layer accumulating above the groundwater level.

As is known, the cotton-growing regions of Uzbekistan are divided into three zones according to soil and climatic conditions, mechanical composition of the soil, technology of its processing and agricultural technology. /eleven/.

First zone. Non-saline serozems with deep groundwater and a relatively large amount of precipitation. Cotton sprouts are obtained from natural moisture. The area of this zone is 25% of all cotton crops.

Second zone. More powerful non-saline serozems with less precipitation, they do not provide normal cotton sprouts in terms of natural moisture without reserve or pre-sowing irrigation. The specific area of this zone is 17%.

Third zone. Soils have varying degrees of salinity. To obtain normal shoots of cotton, leaching irrigation is required.

The specific area of this zone is 58%.

The climatic features of the described zones cause differences in the preparation of the soil for sowing, in the set of machines and tools used. The technology of cotton cultivation in the subzones is the same, except for the number of irrigations and inter-row tillage, which is less in the third zone than in the second and first.

Soil moisture is characterized by the amount of capillary and cohesive water contained in it. Its mechanical strength depends on this, which is reflected in the quality of its processing and in the traction resistance of the tillage tool. The hardness of the soil depends on its mechanical composition and moisture, its content of organic matter, the previous crop, the depth of the previous cultivation, etc. Soil hardness also reflects the structural state, depending on the type of soil, crop rotation, previous cultivation and other factors.

Soil hardness was determined using an Alekseev hardness tester /104/, using a conical tip with a base diameter of 11.3 mm (s=1cm2) and an apex angle of 600.

Humidity and hardness of the soil of the arable and subsurface layers, we determined during the main processing of its subsequent depths: 0-10; 10-20; 20-30; 30-40; 40-50 cm (Table 1). The experiments were carried out on the fields of farms in the Gijduvan district of the Bukhara region.

The relief of the fields is even. The soil texture is heavy.

As can be seen from Table 1, the moisture content of the subsoil layer during its main processing is lower than the moisture content of the arable layer and ranges from 10.3 .... 16.8%. It follows from the obtained data that the soil hardness of the subsurface layer is 1.62....1.93 times higher than the arable layer, and reaches up to 4.15...5.91 MPa. According to H. Gaffarov (75) after the subsoiler was used.

Table 1
Characteristics of soil moisture and hardness during the main processing period

№	Background and prior culture	Humidity, (%) by layers, (cm)					Hardness (MPa), layers (cm)				
		0-10	10-20	20-30	30-40	40-50	0-10	10-20	20-30	30-40	40-50
According to N.S. Bibutov.											
1	Irrigated old-timer, cotton forerunner	18,4	18,7	18,4	13,4	9,3	1,7	2,7	2,9	3,0	4,7
2	Old-timer irrigation, background after corn	13,6	12,7	13,1	12,9	11,0	1,2	3,3	4,4	6,9	7,3
3	Old-timer irrigation, background after corn	12,3	11,5	10,5	9,4	7,3	2,7	3,6	2,8	3,5	3,9
According to the author											
1	old lady old irrigation, predecessor-cotton	13,5	14,2	17,3	14,2	10,3	1,90	2,90	3,55	4,15	4,85
2	Same	14,0	15,6	17,2	15,4	11,5	1,92	2,85	3,67	4,97	5,87
3	Same	13,4	15,5	17,8	16,8	12,1	1,90	2,89	3,80	4,86	5,91

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