THE SOIL OF KEGEYLI DISTRICT

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ABSTRACT

In the irrigated lands of Kegeyli District, meadow and alluvial-meadow soils are mainly distributed.

Irrigated meadow soils are found across all agricultural areas of the district. These meadow soils have an ancient origin; however, in recent decades, as a result of the evolutionary transformation of takyr and takyr-meadow soils, new formations have appeared in certain places. Groundwater is located at a depth of 1–2.5 meters. Its highest level is observed after the leaching of soil salts and irrigation during the vegetation period.

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The close occurrence of mineralized groundwater creates conditions for the development of secondary salinization in the soils. Therefore, when these soils are reclaimed and used for agriculture, they must be equipped with a sufficiently efficient collector-drainage system.

Irrigated meadow soils are the most widely distributed soil type within the irrigated land fund of the Republic.

In the morphological profile of these soils, a plow layer 28–32 cm thick is distinguished. According to their mechanical composition, they vary from moderately heavy loams to sandy loams. The sub-plow layer forms mainly in soils that have been irrigated for a long time; in some cases, it is also found in newly reclaimed soils with a heavy mechanical composition, where its thickness is 8–10 cm. This layer is characterized by relatively high density and a coarse cloddy structure. In many long-irrigated soils, an agro-irrigational layer is present, although it is not very thick. In some cases, the humus-accumulative layer coincides with the agro-irrigational layer; however, more often it lies below it and reaches a depth of 50–60 cm.

In newly irrigated soils, its thickness is limited to 40–45 cm. Beneath these layers lie alluvial deposits that have been less affected by soil-forming processes. These deposits have a distinctly stratified character in terms of mechanical composition. In this part of the profile, signs of current clay formation appear in the form of rust-colored and bluish spots.

Irrigated alluvial-meadow soils are widely distributed both in the subaerial zone and in the subtropical desert zone. They are found in all districts of Karakalpakstan. These soils develop under conditions where the groundwater level lies at a depth of 1–3 meters, and under the influence of irrigation, the soil horizons are periodically and continuously moistened. These two factors alter the soil profile, promoting meadow formation processes, humus accumulation, and an increase in the thickness of the humus layer.

In addition, irrigation facilitates the stratified accumulation of soil particles, which leads to the development of specific properties characteristic of these soils. The humus layer becomes thicker, the mechanical composition changes, and the soil layers become denser. In the upper horizon, a plowed agro-irrigational layer is formed. The formation of this layer is directly related to soil tillage, irrigation, and fertilization practices. At the same time, in newly reclaimed areas with such soils, due to changes in hydrogeological conditions, processes of waterlogging, salinization, and gley formation occur. Among irrigated alluvial-meadow soils, groups of non-saline, slightly saline, moderately saline, and strongly saline soils can be found. In areas where groundwater drainage is well maintained, the soils are almost unaffected by salinization, and the mineralization level of the groundwater remains low.

According to the results of soil research conducted by scientists from the Institute of Soil Science and Agrochemical Research, the total area of irrigated soils in the Kegeyli District is 26,378.0 hectares, of which meadow soils occupy 22,646.9 hectares, or 85.9% of the irrigated land, and alluvial-meadow soils cover 3,731.1 hectares, or 14.1%.

Based on their mechanical composition, these soils include 717.0 ha of clayey soils, 1,850.9 ha of heavy loamy soils, 18,808.7 ha of medium loamy soils, 3,971.4 ha of light loamy soils, 779.3 ha of sandy loam soils, and 250.6 ha of sandy soils.

In all agricultural areas of the Kegeyli District, soils are generally characterized by a very low (up to 1%) or low (up to 2%) humus content.

Regarding available phosphorus,

4,262.3 hectares have very low levels (0–15 mg/kg),

13,569.5 hectares have low levels (16–30 mg/kg),

8,388.9 hectares have medium levels (31–45 mg/kg), and

157.2 hectares have high levels (46–60 mg/kg).

As for exchangeable potassium,

8,580.2 hectares show very low content (0–100 mg/kg),

14,799.9 hectares show low content (101–200 mg/kg), and

3,017.8 hectares show medium content (201–300 mg/kg).

In general, 16.2% of the soils in the district belong to the group with very low levels of available phosphorus, 51.4% have low levels, 31.8% have medium levels, and only 0.6% have high levels.

Salinization is one of the main factors affecting the fertility, productivity, and ecological–reclamation condition of irrigated lands. This process depends on the relief (topography) of

the area (massifs), its geomorphological and lithological structure, soil–climatic conditions, and human economic activities.

In particular, the salinization of groundwater causes significant damage to the national economy. Numerous research studies and field experiments have shown that

in slightly saline soils, cotton yield decreases by 20–30%,

in moderately saline soils, by 40–60%,

in heavily saline soils, by up to 80%,

while in highly saline or saline–alkaline soils, cotton seedlings perish completely during the first irrigation.

The main reason for this phenomenon is the toxic effect of harmful salts in the soil on plants. Therefore, when assessing the soil-reclamation condition of irrigated lands, special attention should be paid to the degree and type of salinity, as well as to the salt content (%) and salt reserves (tons per hectare) in both the plow layer (0–30 cm) and the root zone (0–1 m).

In the Kegeyli District, irrigated soils include:

3,326.9 hectares of non-saline lands,

10,432.1 hectares of slightly saline lands,

8,462.5 hectares of moderately saline lands,

1,919.3 hectares of strongly saline lands, and

2,237.1 hectares of highly saline lands.

In conclusion, the district is characterized mainly by meadow and alluvial-meadow soils, which are generally poor or very poor in nutrient elements. Most of the area is affected by different degrees of salinity, which must be taken into account when determining the annual rates of mineral fertilizers for agricultural crops. Moreover, it is recommended to apply mineral fertilizers in a differentiated manner during the vegetation period to improve soil fertility and crop productivity.

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