Properties and fertility of irrigated soils of eastern Fergana

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Abstract: *In the article a change in the properties of the irrigated soils of Asaka district in eastern Fergana under many years of agriculture is analyzed, which new data on change of mechanical composition, salinity degree, content of humus and nutrient elements with the influence of various geomorphological, lithological, hydrogeological, anthropogenic and climatic conditions is given.*

Key Words: *Irrigated soils, hydromorphic soils, light serozem, meadow, meadow-saz, serozem-meadow, irrigated agriculture, mechanical composition, salinity level, nutritional elements, humus.*

1. INTRODUCTION:

In the course of the Republic's growing market economy, the state-owned agrarian law complex serves to deepen economic reforms in agriculture, food and other agricultural products in the implementation of economic policies of the state. Important features of these laws are that they are more likely to fight the problem of the country's population more strongly and raise market-demand market relations to a new level. A complex of agroecological laws during the current upheaval of the Republic of Uzbekistan contributes to the improvement of soil fertility, deepening of economic reforms, rich harvesting and improvement of quality of agricultural products.

Therefore, the comprehensive study of the irrigated soils of the Republic, their current status and productivity, the prevention of identified negative phenomena and elimination of their consequences are among the most urgent issues of today.

The irrigated soils of eastern Fergana are located in plains and foothills, requiring specific agro-technical and agromeliorative measures in agriculture. Because the irrigated lands of the mountainous areas are under water erosion risk, and in flat groups salinization measures should be undertaken. Under such conditions, it is desirable to solve the problems related to the effective and rational use of land resources, preserving and increasing soil fertility, based on scientific research.

2. MATERIALS AND METHODS:

Part of our soil research in this direction was conducted in irrigated soils of farms in Asaka district, one of the eastern Fergana region, and the current state of existing irrigated soils has been studied, and their properties have been identified.

The main soil forming sedimentary beds for soil cover of the district are quaternary beddings and all alluvial and submerged plains and river valleys covered by thick quaternary layers.

Basics of research methodologies are the methods of analyzing soil maps data, comparative geographical, soil-cartographic, laboratory, cameral-analytical, and the methods of assessing the quality of irrigated land. Preparation, field, cameral and cartographic works were carried out on the basis of "Methods of soil survey and soil mapping for the State Land Cadastre", laboratory-analytical works developed and adopted by the Research Institute of Soil Science and Agrochemistry.

3. RESULTS:

The irrigated soils of the Asaka district are formed on the prolyuvial-aluuvial deposits in the middle and lower part of the Shahrikhonsay spread [3]. It is evident that the soils of the studied territory, formed by the various geomorphologic, lithologic, hydrogeological and climatic conditions, have undergone different processes of soil formation. In the study area, irrigated light serozem, serozem-meadow, meadow, meadow-saz and meadow-bog are spread (Fig.1).

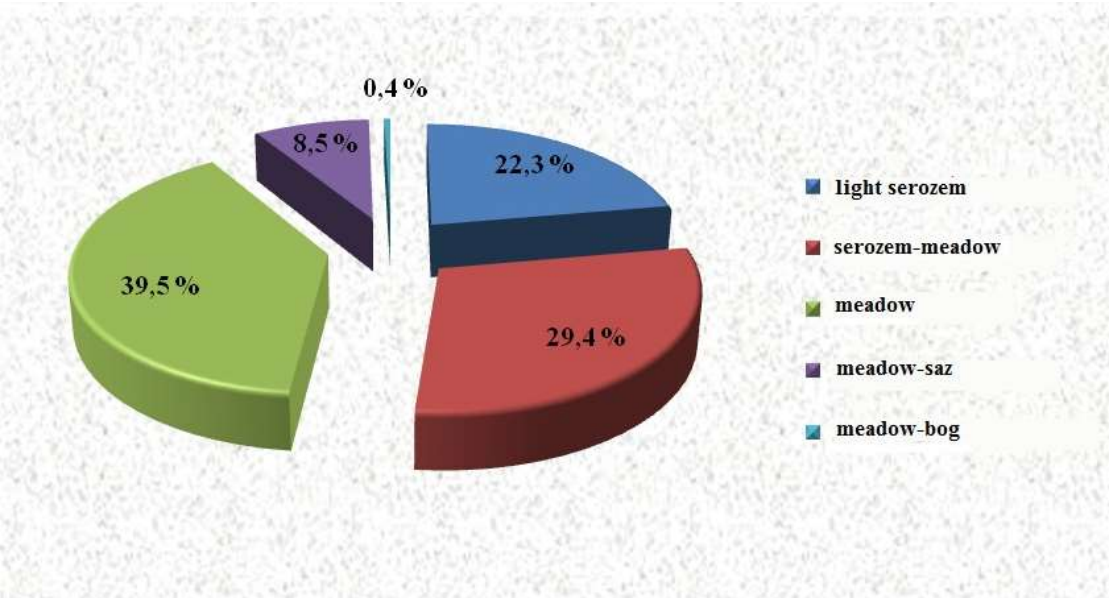

Figure 1. The area of the studied irrigated soils, in %

Irrigated light serozem soils are divided into old and new irrigated groups. They are connected to cone springs and adyrs. Agro-irrigation layer in old-irrigated light serozem soils has a thickness of 0.5-1.0 m, the mechanical composition is moderate, and in some cases 1-2 m gravel is laid. New irrigated light serozem soils are deposited on the hillsides, in some places in 0.3-0.5m in the conglomerates or in the tertiary clays.

The amount of humus in the topsoil layer varies from 0.84% to -1.13%, mobile phosphorus is 7.4-17.2 mg / kg, potassium 120-275 mg / kg. It is evident that the irrigated light serozem soils are supplied with humus low and moderately, by mobile phosphorus low and very low, by potassium low and moderately, to the lower layers of the soil a sharp decreasing in the amount of humus and nutrients is observed.

Irrigated serozem-meadow soils are formed on the second terraces on the slopes and overlooking the rivers, where the water level is formed on the alluvial deposits, with a height of 2-3.0 meters, and is a transition from gray soils to greening soils. According to the mechanical composition, the light and average loamy, light loamy and sandy on the lower layers and the humus content of irrigated serozem-meadow soils is 1.13-1.38% on average, and the mobile phosphorus is 6.4-16.4 mg / kg and the amount of potassium is about 180-290 mg / kg, whereas it is included in groups of low and moderate supply groups. These studied soils are not gypsum, mainly low and moderately saline, and the salinity type is sulphate.

Irrigated meadow soils are formed on the allyuvial beds, in the zone of serozem soils and in the desert zone, where the water level is 2-2.5 meters, and according to their mechanical composition mainly medium and heavy loamy, the concentration of humus is less than 0.80% -1,24%, the amount of mobile phosphorus varies from 6.4 to 24.4 mg / kg and potassium 180-345 mg / kg. It is evident that the irrigated meadow soils suuplied with humus low and moderate, by mobile phosphorus are very low and low, by potassium very low and high in some parts, and the amount of humus and nutritional elements decrease to the lower layers of the soil. These soils are not gypsum, mainly non saline, and sometimes moderately saline in smaller areas, although they are used in irrigated agriculture. Dry residue on average saline soils is 0.725-1.150%, salinity type is sulphate.

Irrigated meadow-saz soils are widely spread in the Shahrikhonsay area according to the soil-geomorphologic location. In these soils the water level is formed in the conditions of irrigation-alluvial regime, with a depth of 1.5-2.5 meters, and is medium and light loamy in terms of its mechanical composition. Under the agro-irrigation layer, the soil profile is sharply changed, and loamy layers are replaced by sand and sandy layers.

The humus content of the meadow-saz soils in topsoil is 0.76% -1.26%, the content of mobile phosphorus is 8.5-15.6 mg / kg, potassium 177-244 mg / kg. These soils are not gypsum, mainly low and moderately saline, and the salinity type is sulphate.

Irrigated meadow-bog soils - are spread in the I-II terraces of the rivers, in the conditions of 0.5-1.0 m groundwater levels. According to the mechanical composition of the Bobur area is average loamy, the humus content of irrigated meadow-bog soils is 1.0-1.15% on average, and the mobile phosphorus content is 5.33-10.80 mg / kg , potassium - 180-230 mg / kg, which was found to be very low, low and moderate in soil with these nutrients. In some areas where these soils are spread, the strong clay profile begins at the top, mostly saline, and the salinity type is sulphate.

As you can see from the information above, all types of soils are subjected to salinization at some extent. 41.8% of the irrigated soils are not saline, and the remaining 58.2% are saline at varying degrees, and most of saline lands are poorly saline areas. This is due to the sharp increase in groundwater in the soil in recent years. The increased groundwater level is mainly due to the fact that the system of irrigation has not been cleaned and groundwater flow is not adequately maintained.

The allocation of lands to agro production (cadastral) groups - poor, below average, average, good and very good land (classes), first of all, allows scientifically-based agricultural production, proper selection of agro-technical and agro-meliorative measures and allocation of crops based on soil fertility .

As noted above, soils of the territory of the region is formed on Aravon-Shakhrikhondoy beds consisting of alluvial-prolyuvial deposits of the light serozem soils zone, the soil fertility of the studied soil assessed based on the results of field, chemical analysis and cameral researches.

Taking into account the productivity and potential of the light serozem soils, they are united to the four quality groups - below average, average, good and very good cadastral groups:

The first group (III-IV grade) is considered as below average lands in terms of grade, and the bonitet score is 21-40 points. The total area of irrigated soils with such bonitet points is 480.4 hectares;

The second group (grade V-VI) is considered average in terms of quality, and the bonitet score is 41-60 points. The total area of soils with these bonitet points is 1984.1 hectares.

The third group (VII-VIII grade) is considered to be a good and the bonitet score is 61-80 points. The total area of these soils is 414.3 hectares.

The fourth group (IX-X grade) is a very good quality group, with bonitet score of 81-100 points. The total area of such soils is 92.5 hectares.

2971.3 hectares of light serozem soils were evaluated on average by 51 points.

Serozem-meadow soils has been merged into three – below average, average and good cadastral groups according to the quality:

The first group (III-IV grade) is considered as below average in terms of grade, and the bonitet score is 21-40 points. Total area of irrigated soils with such bonitet points in the area is 529,3 hectares.

The second group (grade V-VI) is considered average in terms of quality, and the bonitet score is 41-60 points. The total area of such soils is 61.3 hectares.

The third group (VII-VIII grade) is considered to be a good and the bonitet score is 61-80 points. The total area of such soils is 2851.7 hectares.

3442,3 hectares of grass-grass soils studied on the region were evaluated on average by 67 points.

Meadow soils are incorporated into two - a good and good cadastral group according to the quality:

The first group (grade V-VI) is considered average in terms of quality, and bonitet score is 41-60 points. The total area of such soils is 121.5 hectares.

The second group (grade VII-VIII) is considered to be a good and the bonitet score is 61-80 points. The total area of these soils is 4568.0 hectares.

4689.5 hectares of meadow soils studied on the area were rated on average 71 points.

Meadow-saz soils is united into the single – good quality cadastral group:

The first group (VII-VIII grade) is considered to be a good and the bonitet score is 61-80 points. The total area of these soils is 1005.1 hectares.

1005.1 hectares of meadow-saz soils studies on the region were rated on the average 67 points.

In terms of quality of soils, meadow-bog soils have been merged into a cadastral group of good quality:

This group (VII-VIII grade) is considered to be a good, with bonitet score of 61-80 points. The total area of such soils is 68.3 hectares and was rated on average 62 points.

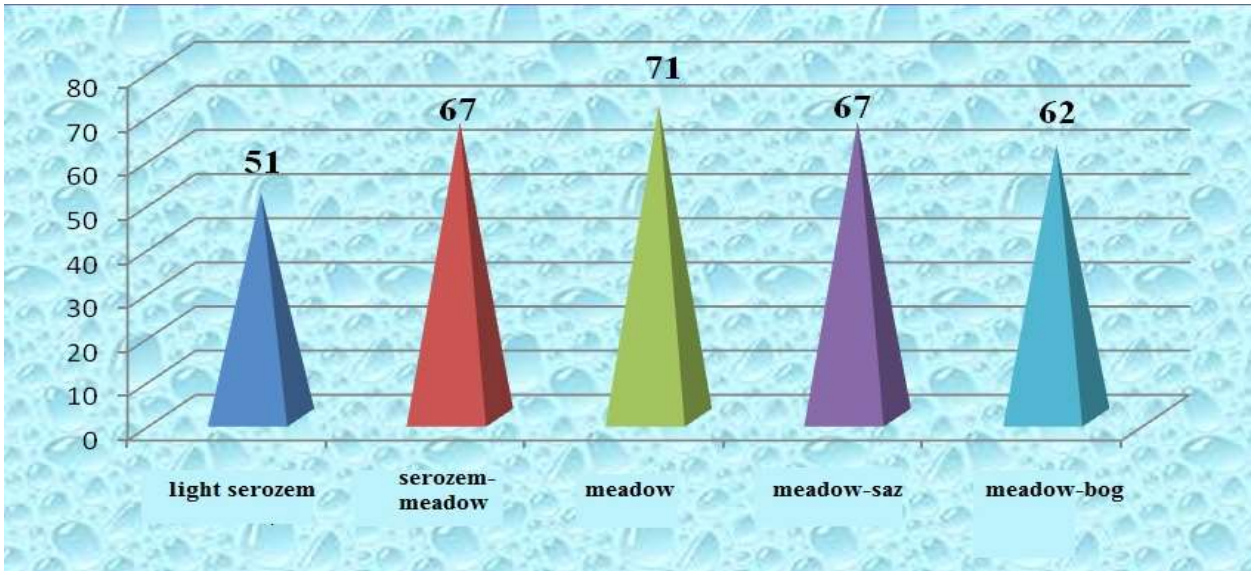

Figure 2. An average bonitet scores of irrigated soils in the studied area

3. CONCLUSION:

In conclusion, it should be noted that in most cases, the irrigated soils of the studied region have to use organic fertilizers and phosphorus, especially potassium fertilizers, in view of the fact that their supply by humus is low, moderate by phosphorus and potassium have a negative impact on their crops. It is desirable to use mineral fertilizers on the basis of agrochemical maps, taking into account soil conditions and plant requirements.

In addition, opportunities will be created for the introduction of intercropping systems, effective use of land resources through the proper placing of agricultural crops, preservation and restoration of soil fertility.

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