Ekologiya. Biologiya

УДК: 631.481; 626.87

SOIL–RECLAMATION CHARACTERISTICS OF IRRIGATED LANDSOF ZARAFSHAN BASIN

A.J.Kushakov - *candidate of biological sciences, docent*
M.K.Yuldashov - *candidate of agricultural sciences, docent*
Navoi state pedagogical institute

Таянч сўзлар: мелиорация, тупроқ, геоморфология, шўрланиш, гумус, фосфор, сур тусли қўнғир, ўтлоқи, литология, гипс, агротехник, ҳавза.

Ключевые слова: мелиоративность, почва, геоморфология, засолённость почвы, гумус, фосфор, серо-буро-луговых, литология, гипс, агротехник, бассейн.

Key words: reclamation, soil, geomorphology, salinization, humus, phosphorus, gray brown meadow, lithology, gypsum, agrotechnical, basin.

Introduction. The area of saline soils in the irrigated lands of the Republic of Uzbekistan is 2 million 48 thousand hectares, of which 1 million 743.6 thousand hectares (72.1%) are saline soils of different levels. In particular, a total number of irrigated agricultural area in Navoi region is 96.8 thousand hectares, of which 62.4 thousand hectares (64.5%) are affected by salinization (Reclamation of irrigated lands of the Republic of Uzbekistan and their improvement. Tashkent, "University" Publishing House, 2018) [1].

The Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated February 24, 2014 № 39 "On additional measures to ensure the unconditional implementation of the State Program for the improvement of reclamation of irrigated lands and rational use of water resources for 2013-2017"defines the study of saline soils on irrigated agricultural lands in our country and implementation of work to prevent salinization.

Research has shown that the influence of hot weather, evaporation of groundwater in alluvial, agroirrigation and loess rocks and the accumulation of easily soluble salts in the soil surface layers are the main reasons for the occurrence and development of secondary salinization processes. In addition, these processes occur in the Zarafshan basin, under the influence of natural anthropogenic factors, the groundwater level approaches the surface (1-3 m) and their mineralization level exceeds 3-5 g / l., as a result soluble salts accumulate in parts of the soil which leads to the secondary salinization processes that [2].

The results of the study will be important for the implementation of the State Land Cadastre and monitoring the improvement of the reclamation and fertility of soils in the foothills of the desert region. [3].

The main goal is to determine the level of salinity of the soils of irrigated lands and the negative impact of salinity on soil fertility and develop scientifically based recommendations to prevent soil salinity, based on the analysis of soil samples obtained in the study.

Research methods. Irrigated lands of Kyzyl tepa district of Navoi region, located in the middle part of Zarafshan basin, were selected as the object of research.

The research was carried out in the Republic of Uzbekistan in accordance with the "Instructions for soil research and soil mapping for the State Land Cadastre" (2013), as well as methods of comparative geochemical and laboratory-analytical analysis.

Research results and discussion. The total irrigated ar-
ea of Kyzyltepa district in Zarafshan basin is 24459.1 hectares.Kyzyltepadistrict, due to its geographical location, belongs to the arid continental climate region (province) of Central Asia and is distinguished by its distinctive features belonging to the foothill semidesert zone. The general climatic conditions of the region are formed under the influence of two factors: the desert climate and the climate of the foothills. The climate is characterized by a sharp continental dryness in the plains and foothills, a decrease in air temperature in the hypsometric foothills, solar radiation, daily, monthly, annual and seasonal temperature fluctuations, and uneven distribution of atmospheric precipitation throughout the year [2].

The area consists of wide wavy plains, from geomorphological point of view the southern slopes of the Nurata mountain range to the south of the loess and alluvial-proluvial deposits, and in the east the Ziyovuddin-Zrabulok ridge descends to the south in the foothill plains formed by the proluvial deposits. The lands of the region are located at an altitude of 400-550 m above sea level. The brown meadow soils of the region are formed in different lithological and hydrogeological conditions. [3].

According to the Bukhara branch of the "**Uzdaver loyiha**" Institute of the State Committee for Geodesy and Cadastre of the Republic of Uzbekistan, the peculiarities of these soils are the tendency to wind and water erosion and salinization processes, the lack of humus and other nutrients, the lack of their mobile forms,relatively deep level of the groundwater, moderately mineralized but heavy sandy and muddy, the soils are mainly medium and light sandy, whereas mechanical compositions are too sandy.The amount of physical sludge in these soils is 35-68% of the soil profile. This indicates the weight of the mechanical composition. The aggravation of the mechanical composition of the soil is due to the accumulation in the soil profile of fine particles in the composition of irrigation water for many years (Table 1).

Mechanical composition of soil

Depth cm	The amount of fractions (%), the particle size (mm).							
	> 0,25	0,25-0,1	0,1-0,05	0,05-0,01	0,01-0,001	0,005-0,001	<0,001	Physical sludge (<0,01мм)
27 АК – section consists of proluvial deposits. Urtachul district Grey brown meadow soils								
0-26	1,6	27,4	29,0	7,5	14,9	9,0	10,6	34,5
26-50	1,8	26,6	27,0	9,0	14,6	10,1	10,9	35,6
50-88	5,4	21,2	23,3	9,2	13,7	8,5	18,7	40,9
110-140	44,5	25,8	10,8	4,5	4,1	4,0	6,3	14,4
22 АК – sectionconsists of layered alluvial deposits. Buston massive Irrigated alluvial meadow soils								
0-30	0,50	0,84	4,30	34,57	14,89	24,70	20,20	59,79
30-60	0,38	0,70	5,35	32,31	19,20	22,30	19,76	61,26
60-90	0,43	0,74	4,30	26,05	17,28	29,35	21,85	68,42
100-130	0,30	3,02	14,16	47,20	8,80	13,16	13,36	35,32

The amount of humus in the top plowing layer of the soil is 0.60 -1.60%, mobile phosphorus averages 20.6-41.7 mg / kg and exchangeable potassium 177.1-241.0 mg / kg. One of the peculiar features of these gray-brown meadow soils is the shortness of the humus layer, the upper layers of which are subjected to varying degrees of leaching under the influence of irrigation and atmospheric precipitation,in some areas the upper horizons are washed away, and the carbonate low-lying strata are located close to the surface. Excluding some soil distinctions, the soil is poor in terms of mobile phosphorus and potassium (Table 2). In the main areas of the natural and artificial low-lying part of the region, high levels of irrigation and a number of other factors allow groundwater to rise to the surface, which in turn intensifies the processes of salt accumulation and re-salinization in the soil.

Table 2

Quantitative indicators of humus and nutrients in soils

Depth cm	Humus %	Nitrogen %	Phosphorus		Potassium mg / kg	SO2 carbonates %	C:N	pH
			Gross	mg / kg				
27 АК – sectionconsists of proluvial deposits. Urtachul district Grey- brown meadow soils								
0-30	0,60	0,062	0,150	20,61	177,1	12,66	5.6	7,2
30-60	0,51	0,050	0,148	13,42	180,6	12,34	5,9	7,3
60-90	0,32	0,031	0,131	9,06	167,4	11,60	6,0	7,1
100-130	0,20	0,017	0,116	6,12	160,7	10,96	6,8	7,2
22 АК – section consists of layered alluvial deposits. Buston district Irrigated alluvial meadow soils								
0-32	1,60	0,096	0,215	41,7	241,0	9,20	9,7	7,40
32-50	1,26	0,084	0,204	38,6	196,4	9,15	8,7	7,40
50-90	0,90	0,068	0,184	29,3	181,2	9,00	7,7	7,32
90-135	0,80	0,066	0,105	18,0	167,1	8,92	7,0	7,45

In some areas, the groundwater level is 1.0-1.5 meters with a seasonal vibration amplitude.Especially in the lowlands of the plains, where groundwater flow is almost non-existent, the amount of easily soluble salts in water has been increasing, and the initial salinity type in soils and groundwater is becoming mainly sulfate and chloride-sulfate and salinity type.In the group of non-saline and low-salinity soils, the dry residue is 0.135-0.102%, easily soluble salts (NaCl, Na2SO4, MgSO4). In moderately saline segments, by contrast, the amount of dry residue is 1,433–2,729%, while in strongly saline segments it is 0.542–4,598%. In the lower horizons, the amount of salts decreases to 0.165-0.199%. The amounts of chlorine and sulfate ions are recorded at a depth of 0-30 sm and given in the following indicators 0.755 and 1.380%. Gypsum (CaSO4 • 2H2O) in irrigated soils of the region occurs in different forms and amounts in soil layers at different depths from 20, 50, 90 cm to 120 cm.

As a result of dynamic changes in the hydrogeological conditions of the region throughout the year and irrigation-related measures, different levels of salinization processes have occurred.

There are 24459.1 hectares of irrigated agricultural land in the region, 697 hectares of non-saline soils. This is 2.85% of irrigated land, 26.01% of the total area of low-salinity 6480.1 hectares, 10919.3 hectares of medium saline land, which is 44.64% of the total area, 6362.1 hectares of highly saline land. or 26.01% of the total irrigated land.

It is obvious that the reclamation condition of soils in the district is not good, consequently the area needs the through study of soils,taking systematic measures to improve reclamation and saline leaching.

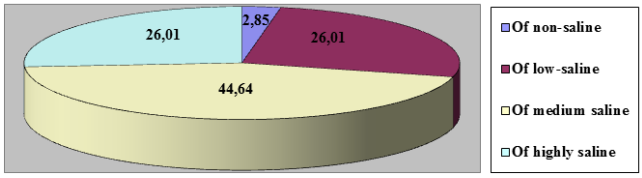

Figure 1 Land area of irrigated lands of Kyzyltepa district by salinity level (in %).

Natural processes in the course of salinity genesis and salt migration are also greatly influenced by multifaceted complexes of irrigation, reclamation and agrotechnics. An important and easily comparable indicator characterizing saline soils for irrigated areas is the average specific amount of salts (reserves) in the 0-1 meterlayer of soil. This quantitative indicator gives an idea of the total amount of salts that must be removed from the soil, for example, in saline washing operations [4].

The salt reserves in the 0-1 meter layer on the surface of the grey brown-meadow soils of the studied area are formed owing to the natural conditions of the farms, as well as anthropogenic factors and agricultural culture. According to the chemistry of salinity, it consists of sulphate and chloride-sulphate types of salinity. The sharp increase in the total amount of salts in the upper 0-1 meter layer of strongly saline soils was observed in Bukhara, Zarafshan, Malikchul, Al-Bukhari, Vorozun, Dehkanabad, Zarmetan, Mehnatrohat, Navoi,Kuyimazor, Tavois,Toshrabot districts.

Conclusion. In the middle part of the Zarafshan basin, irrigated lands are saline to varying levels and consist of different mechanical compositions and salinity types.Soil and reclamation conditions are more severe than in a number of other desert areas.In order to prevent salinization, increase soil fertility and maintain soil salinity in the main irrigated areas,to increase crop yieldsthe following tasks and measures are required to be taken:

1) to study the morphological structure, characteristics, physical and chemical properties of the main soil types and subtypes in the territory of Kyzyltepa district under the influence of anthropogenic factors;

2) to ensure the operation of the existing collector-drainage network system,taking into account the forms of salinity accumulationin the soil to transfer hydromorphic water regime (at groundwater at 1.5-2.5 m) to semi-hydromorphic water regime (at 2.5-3.0 m);

3) to keep the groundwater level below the "critical depth" (2.5-3.0 m);

4) The slope in the Zarafshan basin is wavy alluvial-proluvial, developed in the plains, to the parent rock of saline soils with different salt content and shape, depending on the mechanical composition, gypsum and layer thickness, as well as the depth and level of mineralization of groundwater, it is advisable to strengthen research and practical measures to determine the timing and standards of saline washing.

References

1. Ўзбекистон суғориладиган ерларининг мелиоратив ҳолати ва уларни яхшилаш. –Тошкент: ”Университет” нашриёти, 2018. 89-б.

2. Артикова Х.Т. Почвы Бухарского оазиса и изменение под влиянием орошения. Афтореф. дисс. канд. биол. наук. – Ташкент: ГосНИИПА, 2005. –С. 25.

3. Кушаков А.Ж. Маликчўл тоғ олди текисликларининг суғориладиган сур тусли қўнғир тупроқларидаги шўрланиш жараёнлари ва шакллари. Б.ф.н. дисс. автореферати. – Тошкент: ТАИТДИ, 2007. 28-б.

4. Кушаков А.Ж. Ўзбекистон Республикаси чўл зонаси сур тусли қўнғир тупроқларининг шўрланиш жараёнлари ва шакллари. Монография. -Навоий: НДПИ: 2017. 136-б.

REZYUME

Zarafshon havzasi tog‘ oldi tekisliklari, sur tusli qo‘ng‘ir o‘tloqi gipslashgan tuproqlarda turli tabiiy omillar ta’sirida sho‘rlanish jarayonlari paydo bo‘lmoqda. Tuproqlardagi sho‘rlanish jarayonlarining oldini olish va ularni tadqiq etish, erlarning meliorativ holatini tubdan yaxshilash, tuproqlarning unumdorligini oshirish va ulardan oqilona foydalanish uslublarini yaratish zarur.

РЕЗЮМЕ

Под влиянием различных природных факторов процессы засоления происходят в серо-буро-луговых гипсовых почвах в предгорьях пустынных районов бассейна Зарафшан. В данной статье указывается необходимость предотвращения и изучения процессов засоления почв, для того чтобы улучшить мелиорацию земель, повысить плодородие почв и разработать методы их рационального использования.

SUMMARY

Under the influence of various natural factors salinization processes are occurring in the gray brown meadow gypsum soils in the foothills of desert regions in Zarafshan basin. The following article discusses the necessity of preventing and studying the soil salinization processes, in order to improve the reclamation of lands, to increase soil fertility and develop methods for their rational use.