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GENETIC RECLAMATION DESCRIPTION OF SAZ SOILS OF CENTRAL FERGHANA MEADOW

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Abstract. This article presents the results of the research conducted in the irrigated lands of Central Fergana, including the information on the salinity levels and types of gypsum and carbonates of different degrees of plastered grassland soils. The mechanical composition and agrochemical properties of studied grassland saz soils are briefly described. The total areas of gypsified soils in the irrigated lands of the republic are given and they are divided into groups according to the degree of gypsification. The accumulation of salt and the formation of gypsum in the lands of Central Fergana, the increase in the volume and saz of the soil has a negative effect on the number and activity of microorganisms living in it, the physical, water-physical, physical-mechanical properties of the soils of the region, water-salt regimes, soil reclamation conditions, and various scientists and opinions of experts are presented. O.Komilov and V.Isakov’s physical and chemical properties of hornblende, clay and gypsum soils distributed in Central Fergana lands, ways of increasing their productivity are shown, N.G.Minashina and V.V.Egorov’s opinions on gypsum soils are presented. It is emphasized that the role of seepage water in the occurrence of salinity in the meadow saz soils is extremely large, the concept of “critical” depth and “critical mineralization” of ground water is explained. The amounts of salts, types of salinity and the depth of salt horizons in the soil profile of non-gypsified, weakly and moderately gypsified soils were thoroughly analyzed. Recommendations aimed at improving the reclamation condition of the studied soils, restoring and increasing their productivity are given.

Key words: meadow sedge, salinity, gypsum layer, humus, nitrogen, potassium, phosphorus, sedimentary rocks, alluvial plain, river cones, nutrients.

Introduction: Central Fergana deserts, located in the central part of Fergana valley, have developed during historical geological periods, and since the valley area is surrounded by mountains on three sides, it served as a collection point for a number of rivers and streams flowing from them and flood waters, resulting in various sediments brought by water. Rocks have been accumulating for many years. In this case, due to the change of the flow of water according to the seasons, the amount of deposited deposits and their mechanical composition also changed. Since the Central Fergana area consists of low depressions and sediments, it is impossible for water to flow out of these areas, so the water is mostly used for suffocation in the hot seasons, and as a result of water erosion, easily soluble salts accumulate in the area along with clay, sand, sandy, and sandy rocks. Served as a place, as a result, together with the rocks brought by water erosion, they also served as a reservoir for the salts contained in them.

The total area of gypsum soils in the irrigated agricultural land of our republic is more than 383,2 thousand hectares, which is 10,3% of the total irrigated agricultural land, of which 5,1% is weak, 3,5% is medium and 1,8% is strong and are very strong gypsum soils. Gypsum soils are usually characterized by high salinity, over-densification, poor water permeability, and soils in such an unfavorable condition have a negative effect on the optimal development of plant root systems.

The irrigable, relatively high-productivity lands in the republic are almost fully developed. The soils that have been developed in recent years and can be developed in the coming years belong to the category of hard-to-develop soils with low fertility, saline, gypsum, stony. Their assimilation should be carried out in a very thorough and comprehensive manner. In this sense, effective use of irrigated gypsum lands currently used in agriculture in our republic, taking into account gypsum formations, depth of placement in the soil profile, and gypsum layer thickness, to determine the degree of gypsification of soils, to restore, increase and manage their productivity, soil properties A detailed study and improvement of its characteristics and land reclamation is one of the urgent tasks.

Statement of the issue: Effective use of land and water resources in the republic serves to maintain and restore the melioration status and productivity of agricultural lands. Because the processes of soil salinization and plastering are directly related to the depth and mineralization of seepage waters. However, to this day, there are still unsolved issues related to maintaining and restoring the productivity of hard-to-reclaim land, especially gypsum land, and improving land reclamation.

Solution method (methods): The research was carried out in field, laboratory and chamber conditions according to the standard methods generally accepted in soil science. Chemical-analytical and profile methods were used, including chemical analyzes “Soil Chemical Analysis Guide” by E.V.Arinushkina, field research and camera research “Instructions for carrying out soil research and drawing up soil maps for the state land cadaster” and soil evaluation works Mathematical-statistical analysis of the obtained data was carried out on the basis of the “Methodological instruction on the validation of irrigated soils of the Republic of Uzbekistan” and was analyzed according to the method of dispersion B.A.Dospekhov using the Microsoft Excel program.

Research object and analytical results: The object of research is the irrigated meadow saz soils, which are formed from massive, layered alluvial deposits named F.Shamsiddinov, in the Central Fergana area of Uchkoprik district, Fergana region, developed in the old alluvial plains of the Syrdarya. Mechanical composition of soils, reclamation properties, genetic layers, chemistry of salts, composition and reserves, hornblende, arzic, gypsum layers, depth of seepage water, changes in the type and proportions of salts, formation of saline profile, amount of carbonates, forms of gypsum, thickness of gypsum layer, location of gypsum depth, reclamation of saline soils.

According to M.A.Pankov (1957), salt accumulation in Central Fergana soils occurred due to Na_2SO_4 and ($CaSO_4$) gypsum. The author explains that the formation of gypsum is one-sided, i.e., it appeared only due to the exchange reaction between calcium bicarbonate and sodium sulfate. In fact, the genesis of gypsum in the soils of this region is multifaceted.

In the research conducted by A.L.Toropkin (1971) on meadow soils, the increase in volume saz of the soil had a negative effect on the number and activity of microorganisms in its composition. According to the results of the research, when the density of the soil is in the range of 1,0-1,3 g/cm^3, aerobic decomposing nitrifiers are well developed.

M.U.Umarov (1974) studied the effect of various types of crops on the physical, physico-chemical, physico-mechanical properties of Central Fergana soils, 70-120 cm emphasized that there are dense, impermeable layers between.

S.H.Tojiboev (1978) thoroughly studied the salt regime of the irrigated soils of Central Fergana during his research, revealed the laws of the formation of salt regimes depending on the soil-ameliorative conditions of the region. in addition to giving melioration efficiency, maintaining a sufficient reserve of moisture in the soil before planting, this situation has been found in field experiments to protect the soil from wind erosion. Taking into account the lithological-geomorphological, hydrogeological and soil conditions of Central Fergana lands, he divided them into 7 soil-reclamation regions, and proposed a complex of agro-reclamation activities for each of them.

O.K.Komilov, V.Yu.Isokovlar (1992) studied in detail the physical and chemical properties of carbonate-gypsum, hornblende, arzic-saline, gypsum soils of Central Fergana, as well as ways to increase productivity. It is now well known that wind erosion in these areas has caused great damage to agriculture. In this field, the works of K.M.Mirzajonov, P.N.Besedin, A.N.Mannanova, A.M.Makhataev and others are of great theoretical and practical importance. These scientists developed the agro-melioration, forest-melioration, and agrochemical directions of increasing the fertility of Central Fergana soils.

V.Yu.Isakov (1993) studied the genesis of the formation of arzic, hornblende and gypsum low-fertility soils in the Central Fergana regions and separated these soils as separate soil-geochemical provinces according to their natural and historical conditions, and the role of tectonic and denudation earth movements in their formation was significant. and mentioned that as a result of the combination of sodium, magnesium, calcium and other elements with various ions in the soil under the influence of underground and surface water, different degrees of salinity, gypsum, hornblende, and arzic layers were formed in the soil covers of the region. According to the amount of gypsum and carbonates in the soils of Central Fergana, the author proposed to classify the soils of the region, irrigated meadow saz horn; irrigated meadow saz gypsum-horned; irrigated meadow saz is rich in salt; irrigated meadow with gypsum-arisic-salty; divided into irrigated meadow-barren deep arzic and hakozo soils. The author improved the classification system of N.G.Minashina and V.V.Egorov, while classifying gypsum and arzic soils in this area, dividing them according to the amount of gypsum and salts in the soil. He suggested that it is possible to add these lands to agricultural land types by carrying out phytomelioration works, applying 30-40 tons of local fertilizers per hectare, improving the water permeability of difficult to meliorate gypsum and arzic lands through deep plowing, and establishing grain, orchards and vineyards on hilly lands.

Irrigated grassland soils. Soh cone spread is widespread in the areas adjacent to the old alluvial plains in the peripheral parts, characterized by their light mechanical composition, the soils are mostly sandy and light loam, and sometimes heavy loam layers are found in the soil profile. Soils are plastered and saline to varying degrees. These soils were formed in conditions where groundwater is high (at 1-2 m). Agro-irrigation horizons are characteristic of all old irrigated soils, varying from light sands to heavy sands according to their mechanical composition. Sometimes gravel is laid from a depth of 1-2 m. The level of carbonation of the soil is not high at all (7-8% SO_2), but high carbonation is observed in the lower layers of the soil, which leads to the formation of “horns”. The amount of humus fluctuates between 0,6-1,2%, total nitrogen-0,03-0,11%, phosphorus-0,10-0,13%, potassium-1,70-2,10%, mobile phosphorus 10,0-32,0 mg/kg, exchangeable potassium-108-288 mg/kg The absorption capacity of soils is around 8-13 mg-eq per 100 g of soil, and calcium occupies the leading place (62-73%) in the composition of absorbed cations.

The proximity of mineralized groundwater creates conditions for the development of the salinization process. All newly irrigated grassland soils are affected by salinity. Among them, there are medium and strong saline and gypsum soils to varying degrees.

The state of land reclamation and its productivity directly depends on the mechanical composition of the soil. Under irrigated agriculture, soil processes are variable, and many soil properties change and become unstable in a short period of time. Therefore, its evaluation takes into account properties that are less variable and directly related to the yield of agricultural crops. In the conditions of irrigated agriculture, this property of the soil depends on its mechanical composition, which largely determines the fertility of the soil.

Among the many factors that cause soil salinization, groundwater occupies the main place; therefore, it is necessary to pay special attention to the concepts of “critical depth” and “critical mineralization”. Evaporation of a large amount of moisture (water) from the soil surface in the irrigated lands of our republic with a dry and hot climate naturally activates the salinization process, a large amount of salts accumulates in the irrigated soils, and secondary salinization processes accelerate. For this reason, the main amelioration measures should be focused on preventing this negative process and reducing its “toxic” effect on agricultural crops.

In irrigated lands, the closer the mineralized groundwater is to the surface and the more it evaporates from the soil surface, the more rapid the secondary salinization becomes. Strict adherence to supply, irrigation and salt washing regimes, norms and technologies is required.

The formation, movement and accumulation of easily soluble salts in the soil profile (layers) in the investigated massive irrigated saz soils named after F.Shamsiddinov in the Uchkoprik district are very complex geochemical processes. Depending more on the lithological structure of the soil layers, the studied massif lands are salinized to varying degrees, despite the fact that agrotechnical and reclamation activities are carried out in this area (massif) every year, the rates of salinization and plastering in this massif land are still high.

Depending on the degree and types of salinity, the amount and reserves of salts, and the location of salt horizons in the soil profile, different variants (appearances) can be distinguished (Table 1). In addition, “Profiled” salinity is characteristic for many soil sections, i.e., distribution of salts in almost the same high amount in all layers from the top layer of the soil to the groundwater.

According to the results of the analysis of the water absorption analysis data of the soil samples, the amount of water-soluble salts (total salts) in the studied meadow sedge soils ranges from 1,160-1,250% to 1,710-2,230% of dry residue in unplastered meadow sedge soils (section 41, 78). Oscillating, from which the amount of chlorine ions in the soil profile is 0,042-0,105%, sulfates (SO_4) is 0,644-1,246%. Three maximum salinity horizons were observed in the 0-176 cm soil profile of non-gypsum meadow saz soils (section 41). The first salt horizon is located at a depth of 0-26 cm, the salt content is 1,705%, the second salt horizon is observed in the 70-112 cm layer, the total salt content is 2,230%, and finally, the third salt horizon is located in the 112-140 cm layer, and the salts amount was 1,690%, the amount of chlorine ion in these layers was 0,105, 0,094 and 0,066%, respectively. According to the chemistry of salinity, non-gypsum meadow sedge soils consist of sulfate salinity types in all cases (layers) and form a group of medium salinity soils according to salinity level.

The content of salts in weakly plastered ($CaSO_4$*$2H_2O$ 10-20%) meadow sedge soils (sections 1, 20) fluctuates from 0,810-0,980% to 1,105-1,640% of the dry residue, of which the amount of chlorine ions is 0,042-0,080, sulfates It is 0,411-0,940%. In section 1, one salt horizon is 1,640% in the layer of 119-151 cm, and in section 20, the maximum salt horizon is also 1,640% and is located in the upper arable layer. The type of salinity in these soils is also sulfate; the ratio of sulfates to chlorine ions is 8-14. According to the degree of salinity, moderately gypsum soils are weakly (section 1) and moderately (section 20 layers of 83-190 cm) saline (Table 1).

Moderately plastered ($CaSO_4$*$2H_2O$ 20-40%) meadow saz soils (sections 65, 71) is moderately saline, the amount of total salts easily soluble in water is 1.370-1.790%, of which the amount of chlorine ions is 0,063-0,101%, sulfates (SO_4) are 0,791-1,088% (Table 1). In this category of soils, the maximum salt horizons are located in the lower layers of the soil profile (sections 65-71) in layers of 91-130 and 110-150 cm, the amount of salts is 1,370-1,390%, of which the amount of chlorine ions is 0,098%, sulfates are 0,971-1,088% constitutes Medium-gypsum meadow sedge soils are mainly moderately saline, with sulfate salinity types according to salinity characteristics, with a ratio of sulfate to chloride ion of 9-12 (Table 1).

Table 1.
Water absorption content, salinity level and types of irrigated grassland saz soils

Section number	Depth, cm	Dry residue	HCO_3^-	Cl^-	SO_4	Ca	Mg	Na	Salinity	
		%							Type	Level
Not plastered										
41	0-26	1,705	0,024	0,105	0,973	0,255	0,052	0,151	C	Average

	26-43	1,160	0,021	0,042	0,644	0,155	0,046	0,078	C	Average
	43-70	1,240	0,018	0,059	0,689	0,155	0,037	0,126	C	Average
	70-112	2,230	0,024	0,094	1,246	0,270	0,060	0,231	C	Average
	112-140	1,690	0,024	0,066	0,917	0,270	0,046	0,093	C	Average
	140-176	1,630	0,024	0,063	0,884	0,250	0,046	0,099	C	Average
78	0-25	1,250	0,024	0,052	0,716	0,200	0,046	0,068	C	Average
	25-48	1,520	0,024	0,070	0,882	0,210	0,048	0,144	C	Average
	48-76	1,585	0,027	0,076	0,903	0,215	0,048	0,153	C	Average
	76-110	1,610	0,021	0,084	0,928	0,265	0,046	0,115	C	Average
	110-140	1,485	0,024	0,066	0,759	0,210	0,037	0,103	C	Average
	140-176	1,710	0,027	0,098	0,961	0,250	0,042	0,166	C	Average
Weakly plastered										
1	0-27	0,980	0,021	0,059	0,512	0,115	0,037	0,089	C	Weak
	27-37	0,810	0,021	0,045	0,411	0,085	0,037	0,066	C	Weak
	37-60	0,910	0,024	0,056	0,481	0,115	0,030	0,086	C	Weak
	60-83	0,880	0,240	0,042	0,485	0,120	0,033	0,068	C	Weak
	83-119	1,125	0,024	0,066	0,566	0,155	0,043	0,063	C	Average
	119-151	1,640	0,021	0,080	0,917	0,270	0,046	0,101	C	Average
	151-190	1,480	0,027	0,063	0,824	0,205	0,052	0,111	C	Average
20	0-29	1,640	0,021	0,070	0,940	0,250	0,046	0,129	C	Average
	29-42	1,105	0,024	0,045	0,636	0,150	0,037	0,100	C	Average
	42-65	1,210	0,024	0,052	0,656	0,130	0,046	0,120	C	Average
	65-101	1,360	0,024	0,056	0,798	0,265	0,043	0,041	C	Average
	101-137	1,120	0,024	0,045	0,664	0,185	0,064	0,023	C	Average
	137-170	1,105	0,024	0,052	0,588	0,110	0,052	0,098	C	Average
Moderately plastered										

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65	0-25	1,450	0,024	0,076	0,862	0,21	0,046	0,140	C	Average
	25-47	1,720	0,024	0,101	0,975	0,255	0,054	0,146	C	Average
	47-60	1,370	0,027	0,063	0,78	0,20	0,046	0,107	C	Average
	60-91	1,630	0,024	0,094	0,903	0,265	0,046	0,110	C	Average
	91-130	1,720	0,021	0,098	0,971	0,270	0,051	0,129	C	Average
71	0-35	1,370	0,024	0,070	0,771	0,205	0,048	0,097	C	Average
	35-51	1,630	0,240	0,084	0,928	0,250	0,052	0,122	C	Average
	51-69	1,450	0,027	0,066	0,823	0,210	0,067	0,135	C	Average
	69-110	1,570	0,021	0,073	0,882	0,220	0,048	0,134	C	Average
	110-150	1,790	0,024	0,098	1,088	0,250	0,066	0,181	C	Average

According to the distribution of salts in almost the same (average salinity) quantitative indicators in the layers from the uppermost horizons of the soil to the groundwater, these soil sections (sections 41, 78, 20, 65, 71) can be included in the category of profiled saline soils.

When describing saline soils, it is necessary to take into account the degree of carbonation, which is one of the important properties of the soil. In this case, the upper limit of soil "boiling" is determined by dripping 10% HCl acid into the soil horizons in the horizons where carbonates are most concentrated.

The grouping of soils according to the degree of carbonation (SO_2) is presented in table 2.

According to the upper limit of boiling, the soil is divided into groups of surface carbonated, high-profile carbonate boiling at 0-20 cm, boiling at 20-40 cm, moderate profile carbonate boiling at 40-100 cm, and deep carbonate boiling at 100-200 cm.

Table 2.

Grouping of soils according to the degree of carbonation (SO_2).

(Rome, Italy 2017)

№	Level of soil carbonation	Amount of alkaline earth metal carbonates, %
1	Not carbonated	≤2
2	Weakly carbonated	2-15
3	Moderately carbonated	15-25
4	Strongly carbonated	25-50
5	Very strongly carbonated	≥50

Soils consisting of an aqueous mixture of gypsum-calcium with sulfuric acid and containing more than 10% gypsum ($CaSO_4*2H_2O$) are called gypsified soils, and determining the degree of gypsification of the soil is carried out based on the classification of N.G.Minashina (1978) (Table 3).

Table 3.

Classification for determining the degree of plastering of soils

№	Degree of gypsification	Amount of gypsum, % ($CaSO_4*2H_2O$)
1	Not plastered	≤10

2	Weakly plastered	10-20
3	Moderately plastered	20-40
4	Heavily plastered	≥40

According to the data on the amount of gypsum in the soils, there are no laws related to the specific development (evolution and transformation) of the soil in different periods in the distribution and quantitative parameters of the amount of CO_2 carbonates in the gypsum grassland gray soils. While carbonates are distributed in the soil profile in almost the same index (in average amounts), some fluctuations in their amount depend on the mechanical composition of the soil. Only in some cases, it is possible to observe a relatively higher concentration in the gluey layers of the soil adjacent to the surface or groundwater (Table 4).

In general, carbonates form the maximum number of "Carbonate horizons" in most sections. In the soil profile, it mainly fluctuates between 11-15% (Table 4).

Table 4.
Amount of gypsum and SO_2 carbonates in irrigated meadow sedge soils, %

Section number	Depth, cm	SO_4	$CaSO_4*2H_2O$	Average at 0-100 cm	CO_2 carbonates	$CaSO_4*2H_2O+CO_2$ carbonates
Not plastered						
41	0-26	2,83	5,07	5,76	12,30	17,37
	26-43	5,27	9,42		13,57	22,99
	43-70	1,74	3,12		13,20	16,32
	70-112	3,72	6,66		14,15	20,81
	112-140	3,42	6,13		14,00	20,13
	140-176	3,82	6,83		15,90	22,73
78	0-25	4,00	7,16	7,09	14,29	21,45
	25-48	4,90	8,77		13,20	21,97
	48-76	2,98	5,33		17,20	22,53
	76-110	4,16	7,45		14,10	21,55
	110-140	3,62	6,48		13,31	19,78
	140-176	0,96	1,72		12,57	14,29
Weakly plastered						
1	0-27	1,83	3,28	10,40	14,36	17,64
	27-37	1,99	3,57		11,67	15,24
	37-60	7,06	12,64		12,25	24,89
	60-89	9,62	17,22		14,04	31,27
	89-119	6,38	11,41		14,42	25,83
	119-151	2,30	4,12		15,12	19,24
	151-190	4,53	8,11		16,12	24,23
20	0-29	6,48	11,60	10,16	11,19	22,80
	29-42	6,90	12,36		10,70	23,06
	42-65	4,69	8,40		10,66	19,06
	65-101	5,20	9,31		12,67	21,98
	101-137	5,50	9,84		12,09	21,93
	137-170	4,24	7,60		11,40	19,00
Moderately plastered						
65	0-25	17,35	31,06	25,41	11,51	42,57
	25-47	11,78	21,09		10,51	31,59
	47-60	16,17	28,94		12,25	41,19
	60-91	14,81	26,51		12,88	39,39
	91-130	6,40	11,45		10,93	22,38

	130-177	9,68	17,32		10,35	27,67
71	0-35	15,60	27,92	28,63	15,14	43,06
	35-51	14,61	26,16		14,15	40,31
	51-69	16,85	30,16		13,36	43,52
	69-110	16,65	29,81		17,55	47,36
	110-150	9,12	16,33		14,36	30,69
	150-187	2,22	3,97		15,50	19,47

The total amount of CO_2 carbonates in non-plastered soils is 12-17%, (sections 41, 78) 11-15% in weak plastered soils (sections 1, 20), and 10-17% in medium-plastered loess soils.

According to the analysis of the obtained data, the amount of gypsum ($CaSO_4*2H_2O$) in unplastered soils is 3-8%, in weakly plastered soils it is 11-17%, and in moderately plastered soils it is 21-31%. The average amount of gypsum in the 0-1 meter layer is 5,76-7,09, respectively; It fluctuates between 10.40-10.16 and 25,41-28,63% (Table 8).

The total amount of CO_2 carbonates and gypsum (CO_2 carbonates+$CaSO_4*2H_2O$) in the horizons of the soil cross-sections fluctuates between 16-22% in unplastered soils and 30-47% in moderately plastered soils (Table 4).

Conclusion: the structure and morphological structure of the profile of the saz soils of the Central Fergana meadow have a unique character and differ from other soils of the region. Calcium and magnesium carbonates are found in the middle and lower parts of the profile of these soils, and gypsum and slightly soluble salts are found in the upper layers. Shallow and deep arable soil types consist of fine-grained soil saz, up to 32% of gypsum is found. The surface consists of gypsum layers with a content of 20-30% and more in the series of rich soils, easily soluble salts in water are observed in the cross-sections, and the degree of salinity varies from weak to strong.

According to the chemistry of salinity, the studied grassland saz soils consist of sulfate salinity types in all cases (layers), and according to the degree of salinity, form a group of weakly and moderately saline soils. In this case, the amount of dry residue fluctuates in the range of 0,810-2,230%, of which the amount of chlorine ions in the soil profile is 0,042-0,105%, sulfates (SO4) are 0,411-1,246%.

The amount of gypsum ($CaSO_4*2H_2O$) in unplastered meadow saz soils is 3-8%, in weakly plastered soils it is 11-17%, and in moderately plastered soils it is 21-31%. In the distribution and quantitative parameters of CO_2 carbonates in meadow sedge soils with different levels of gypsum, the laws related to the specific development (evolution and transformation) of the soil in different periods are not observed. While carbonates are distributed in the soil profile at almost the same rate (average carbonation rates), some fluctuations in their amount depend on the mechanical composition of the soil. Only in some cases it is observed that it is relatively more accumulated in the gluey layers of the soil adjacent to the surface and ground water. In general, in most cases, the maximum amount of carbonates is “Carbonate horizons”. In the soil profile, it mainly fluctuates between 10,51-17,55%.

Irrigated meadow saz soils with varying degrees of plastering in the central Fergana region were divided into groups of partially moderately, mainly strongly and very strongly (1,33-1,80 g/cm^3) compacted soils, regardless of the culture of farming. In non-gypsum irrigated meadow sedge soils, the total porosity fluctuates between 49-52%, the total porosity in these soils is high in the upper layers and decreases towards the lower layers. High total porosity (TP’) in tilled soil layers is associated with tillage and formation of aggregates. The total porosity in irrigated meadow saz soils with weak plastering was 39-43%, while this indicator decreased to 31% in moderately plastered soils. As the amount of gypsum in the soil, the depth of its placement, the thickness of the gypsum layer increases, the total porosity decreases. Non-plastered soils have a high aeration index; the total porosity of the driving layer is 52%.

REFERENCES

1. Isakov V.Yu. Gypsum-bearing, arzyk and shokhoy soils of the Ferghana Valley, the conditions for their formation and ways of rational use: Abstract of dis.doc.biol.sc. T. 1993. 40 pp.

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ISSN 2063-5346

2. Kamilov O.K., Isakov V.Yu. Genesis and properties of carbonated-gypsum soils of Central Fergana. T. “Fan”. 1992. 136 pp.

3. Minashina N.G. Irrigated desert soils and their melioration. Moscow. “Kolos”. 1974. 270 pp.

4. Pankov M.A. Soils of the Fergana region. T. 1957. 53 pp.

5. Tajiboev S.Kh. Salt regime of irrigated soils of Central Fergana depending on soil-reclamation conditions. Abstract of dis.cand.agr.sc. T. 1978. 24 pp.

6. Toropkina A.L. Macrobiological regime of gray soils and their fertility. T. 1971. 17 pp.

7. Umarov M.U. Physical properties of soils in areas of new and prospective irrigation of the Uzbek SSR. T. “Fan”. 1974.- 282 pp.

8. Ismanov A.J. Evolution and transformation of irrigated soils of Fergana region. Uzbekistan biology. T. 2011. №5. 51-53 pp.

9. Ismanov A.J. Soil coverings of the Fergana Valley. News of UzNU. T. UzNU. 2011. №1/1. 148-151 pp.

10. Kuziev R.K., Sektimenko V.E. Soils of Uzbekistan. T. 2009. 352 pp.

11. Koziev R., Sektimenko V., Ismanov A. Atlas of soil covers of Uzbekistan. T. 2010. 41 pp.

12. Koziev R.K., Abdurakhmanov N.Yu., Ismanov A.J., Akhmedov A.U. Properties, ecological-ameliorative status and productivity of irrigated soils of the Fergana Valley. Monograph. T. “Navruz”. 2017. 328 pp.