SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 3 | March 2024 - Peer Reviewed Journal

UDC 631.4

CHEMICAL AND SALINY PROPERTIES OF SOILS OF THE DRIED BOTTOM OF THE ARAL SEA

Oteuliyev Jaksilik Begdullayevich[1], Dozhanov Kilishbay Jienbayevich[2], Alpisbaeva Akmaral Jubatkhanovna[3]

[1]Doctor of Philosophy in Agricultural Sciences {PhD), Associate Professor
[2]Trainee Teacher
[3]Assistant
Karakalpak State University named after. Berdaha
The Republic of Uzbekistan

ANNOTATION

The article examines the chemical composition and salinity properties of soils at the bottom of the Aral Sea, which have dried out due to drying up of water. Because of this, the vegetative development of plant seeds and seeds planted here is somewhat difficult.

KEY WORDS: *soil profile, salinity, soil nutrients, dry matter, salts, chlorosulfate.*

Currently, the drying up of the Aral Sea is leading to serious climate changes, increased aridity and desertification, and a deterioration of all living conditions in the region. To reduce the negative consequences of this problem, you can mitigate the acute situation by analyzing soil and climatic conditions and selecting plant species adapted to these soils.

For this purpose, research work was carried out in field and laboratory conditions to determine the chemical properties and soil salinity indicators of the dried bottom of the Aral Sea in the Moinak region of the Republic of Karakalpakstan ((0-point) 43°52 '20.4"N 59°01'13, 3"E-circuit).

In subsequent years, millions of plants and thousands of tons of seeds of halophytic plants are planted annually on the dried bottom of the Aral Sea. Not all sown seeds of halophytic plants are able to germinate. Before planting all plant seeds, it is advisable to take into account the soil and climatic conditions of these lands. Therefore, before planting, soil samples were taken in laboratory conditions and the chemical composition of the soils of the dried bottom of the Aral Sea was determined.

Due to the drying of the Aral Sea, various amounts of salt deposits were formed, and in order to study the effect of these salts and other harmful chemical elements on soil and plant fertility indicators, soil samples were taken from the research site in the prescribed manner and analyzed in laboratory conditions and the following results were obtained (table 1)

Table 1.
Chemical composition of soils
(Drained bottom of the Aral Sea, Muynak district, 0-point)

Elements	According to the genetic description of soil layers						
	0-10	10-20	20-34	34-52	52-66	66-79	79-100
Al	2,16	3,84	3,48	6,36	2,86	3,96	4,83
Si	19,7	17,4	29,5	23,9	20,9	21,3	19,9
P	0,427	0,214	0,365	0,447	0,259	0,520	0,334
S	3,85	4,28	0,486	0,437	1,15	0,591	0,371
Cl	2,07	1,40	0,771	1,09	0,589	0,793	1,03
K	1,30	1,20	1,52	1,84	1,01	1,18	1,31
Ca	8,24	12,2	7,86	9,51	10,0	14,0	15,1
Ti	0,213	0,210	0,543	0,317	0,178	0,214	0,212
Cr				0,0124			
Mn	0,0126	0,0261	0,0243	0,0649	0,0182	0,0261	0,0425
Fe	0,586	1,30	0,875	3,66	0,655	1,59	2,17
Ni		0,0015	0,0013	0,0043		0,0015	0,0027
Cu	0,0015	0,0022	0,0019	0,0042	0,0015	0,0025	0,0027
Zn	0,0008	0,0022	0,0013	0,0069	0,0009	0,0022	0,0038

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 3 | March 2024 - Peer Reviewed Journal

As	0,0006	0,0007	0,0007	0,0004		0,0015	0,0006
Br	0,0002	0,0003		0,0002			0,0002
Rb	0,0052	0,0056	0,0063	0,0092	0,0039	0,0050	0,0062
Sr	0,0648	0,0731	0,0397	0,0810	0,0818	0,0882	0,146
Y	0,0008	0,0012	0,0014	0,0018	0,0007	0,0011	0,0017
Zr	0,0185	0,0187	0,0263	0,0210	0,0153	0,0187	0,0237
Ag		0,0004		0,0004	0,0003	0,0248	
Ba	0,0258	0,0289	0,0286	0,0212	0,0203		0,0209
Pb	0,0006	0,0008	0,0009	0,0016	0,0005	0,0007	0,0010
O	61,4	57,9	54,5	52,2	62,2	55,7	54,5

The table shows that in the analyzed soils there are no elements that are a source of nutrients for plants, and those that are present are in very small quantities.

Soil salinization can occur under the influence of natural and anthropogenic factors. Due to the fact that the dried bottom of the Aral Sea is part of a desert region on a dry sea bottom, the process of salinization of desert soils in connection with the rise of underground groundwater is still being studied, several studies have been carried out on the natural salinity level in the desert region.

In salinization processes, salts accumulate in the following cycles: continental cycles, littoral cycles and the third - delta cycle and the third cycle includes river deltas used for irrigation. There are also artesian cycles and anthropogenic cycles. The current process of soil salinization in the study area belongs to the last three cycles.

\In recent years, the drying up of the sea in the Aral Sea region, the deterioration of the natural components of the region, and the increase in the level of salinity of soil covers can be characterized as affecting not only the agrochemical, reclamation state, soil fertility indicators of agricultural land, as well as the ecological state of the entire Republic of Karakalpakstan. Many scientists have conducted scientific research to prevent these negative situations and increase soil fertility by carrying out reclamation measures in the soils of the region.

Table 2.
Indicators of soil salinity on the dried bottom of the Aral Sea (first experimental plot, in spring)

Layer depth, cm	Dry residue, %	Total, NSOz %.mg/eq	Cl- % mg/eq	SO4 % mg/eq	Ca+ % mg/equiv	Mg+ % mg/eq	Anion-cation %	Na+K separately		Component assembly. %	Salinity	
								mg/eq	%		Type	Degree
0-10	0,749	0,012	0,23	0,24	0,05	0,03	11,86,	6,8	0,15	0,712	C	Very strong
		0,2	6,5	5,0	2,5	2,5	5,0					
10-20	1,68	0,02	0,24	0,81	0,07	0,01	24,5	20,0	0,44	1,596	X-C	Very strong
		0,4	7	17,0	3,5	1,0	4,5					
20-30	0,382	0,004	0,127	0,11	0,02	0,002	5,98	4,48	0,10	0,363	C-X	Strong
		0,08	3,6	2,3	1,3	0,2	1,5					
30-40	0,948	0,006	0,213	0,31	0,01	0,12	12,6	10,8	0,24	0,901	X-C	Very strong
		0,1	6,0	6,5	0,2	1,0	1,75					
40-50	1,301	0,006	0,15	0,6	0,03	0,12	17,1	14,35	0,33	1,236	X-C	Very strong
		0,1	4,5	12,5	1,7	1,0	2,75					

Based on the data obtained, it was established that the level of soil salinity fluctuates over large intervals along the soil profile in accordance with the amount of dry residues in it. Thus, one can encounter soils and salt marshes with strong, and in some places very high, salinity levels. It was also noted that layers with different degrees of salinity alternate along the soil profile.

Seasonal variability in the amount of instant salts on the dried bottom of the Aral Sea was discovered. That is, the content of dry residue in the soil of the dried bottom of the Aral Sea is in the range of 0.749-1.680%. According to the type of leaching, it is replaced by sulfated, chlorosulfated, sulfated chlorinated. It turned out that he had very strong salinity. Soil salinity also varied from highly salinized to very highly salinized, as the amount of cations and anions increased as the section deepened.

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 3 | March 2024 - Peer Reviewed Journal

Table 3.
The degree of soil salinity of the dried bottom of the Aral Sea
(second test site, autumn)

Layer depth, cm	Dry residue, %	Total, NSOz %.mg/eq	Cl- % mg/eq	SO4 % mg/eq	Ca+ % mg/equiv	Mg+ % mg/eq	Anion-cation %	Na+K separately		Component assembly. %	Salinity	
								mg/eq	%		Type	Degree
0-10	3,65	0,091	1,15	1,05	0,125	0,09	55,8	42,25	0,96	3,47	C-X	Very strong
		1,5	32,5	21,8	6,25	7,5						
10-20	1,35	0,036	0,319	0,492	0,08	0,006	19,85	1535	0,35	1,28	X-C	Very strong
		0,6	9	10,25	4	0,5						
20-34	0,67	0,012	0,177	0,234	0,03	0,006	10,07	8,07	0,185	0,64	C-X	Strong
		0,2	5	4,87	1,5	0,5						
34-52	1,66	0,048	0,355	0,564	0,18	0,024	22,55	18,05	0,415	1,58	X-C	Very strong
		0,8	100	11,75	3	2						
52-66	1,39	0,036	0,284	0,564	0,04	0,024	20,35	16,35	0,376	1,32	X-C	Very strong
		0,6	8	11,75	2	2						
66-79	1,25	0,036	0,319	0,444	0,07	0,036	18,85	12,35	0,284	1,18	C-X	Very strong
		0,6	9	9,25	3,5	3						
79-100	1,53	0,048	0,497	0,396	0,07	0,006	23,05	19,05	0,438	1,45	X-C	Very strong
		0,8	14	8,25	3,5	0,5						

As a result of agrochemical tests on the dried bottom of the Aral Sea, in comparison with spring tests, it was established that the spring dry residue (section 4) increased from 0.749-1.301%, (section 4) decreased to 3.65-1.66%. It was found that total bicarbonate decreased from the top layer to the bottom by 0.012-0.006%, and chlorine ranged from 1.15-0.497%, sulfate ions decreased by 1.05-0.396% from the surface layers of soils. Of the cations in the soil, it has been established that calcium ions account for about 0.125-0.07%, magnesium ions - 0.09-0.006%, sodium ions - 0.96-0.18%.

In the studied soils, it was noted that salts accumulate differently in genetic layers, mainly depending on agrophysical properties. In some cases, the amount of salts increases from bottom to top, with the maximum amount of salts observed in the uppermost layer, and in some cases, due to changes in the mechanical composition of the genetic layers of the soil, we can observe the accumulation of salts according to a special law.

In general, the soils of the experimental site are characterized by a specific salt profile, the type of salinity is predominantly chloride-sulfate, and in some places soils of the sulfate-chloride type are also observed.
In highly and very highly saline soils, an increase in the percentage of chlorides is observed. Thus, based on the results of studies on the reclamation of the dried bottom of the Aral Sea, it was concluded that the main reason for the relatively wide distribution of saline soils is the natural climatic conditions, the structure of the relief and the hydrogeological conditions of the area.

LITERATURE

1. *Dospekhov B.A.* Methods of field experiment *(Moscow: Agropromizdat, 1985)*
2. *Бекбанов Б.А., Мамбетназаров А.Б., Отеулиев Ж. Кунжут навларининг бирламчи уруғчилик тизими (https://interonconf.org/index.php/usa/article/view/2904)*
3. *Mambetnazarov B.S.. Oteuliev J.B.Improvement of irrigation regime of cotton varieties depending on soil and climate conditions of the republic of Karakalpakstan (https://www.indianjournals.com/ijor.aspx?target=ijor:aca&volume=11&issue=4&article=106)*
4. *Отеулиев Ж.Б. Проблема деградации почв в Республике Каракалпакстан. (https://cyberleninka.ru/article/n/problema-degradatsii-pochv-v-respublike-karakalpakstan/viewer)*
5. *Отеулиев Ж.Б. Экологические особенности почв в аридных территориях приаралья (https://cyberleninka.ru/article/n/ekologicheskie-osobennosti-pochv-v-aridnyh-territoriyah-priaralya/viewer)*
6. *Отеулиев Ж.Б. Влияние почв и грунтов на растения (https://cyberleninka.ru/article/n/vliyanie-pochv-i-gruntov-na-rasteniya/viewer)*
7. *Отеулиев Ж.Б. К вопросу экологического образования и воспитания с использованием системного подхода (https://cyberleninka.ru/article/n/k-voprosu-ekologicheskogo-obrazovaniya-i-vospitaniya-s-ispolzovaniem-sistemnogo-podhoda/viewer)*
8. *Oteuliev J.B., Aytbaeva K. The effect of different stimulators on the germination and growht of halophytic plants seeds. (https://karsu.uz/wp-content/uploads/2023/01/2022-3-2-%D1%81%D0%B0%D0%BD%D1%8B.pdf)*
9. *Отеулиев Ж.Б., Кунназаров У.Б., Досжанов К.Ж., Уралбаев Н.К. Қуриган Орол денгизи шўрланган тупроқларида экилган галлофит ўсимлик уруғи ва кўчатларига гидрогел*

SJIF Impact Factor (2024): 8.675| ISI I.F. Value: 1.241| Journal DOI: 10.36713/epra2016 ISSN: 2455-7838(Online)
EPRA International Journal of Research and Development (IJRD)
Volume: 9 | Issue: 3 | March 2024 - Peer Reviewed Journal

маъсupu(https://api.scienceweb.uz/storage/publication_files/3471/15735/656ea7cdde2e0___3-%D1%81%D0%BE%D0%BD%202023.pdf#page=61)

10. *Allamuratov M., Xojasov A., Oteuliev J., Genjemuratov K. Agrotechnical affairs for the production of local corn sorts in the case of salted soils of the Republic of Karakalpakstan. (https://api.scienceweb.uz/storage/publication_files/170/1270/61bee5ca8c7de___2021-%D0%B9%D0%B8%D0%BB-2-%D1%81%D0%BE%D0%BD.pdf#page=23)*
11. *Oteuliev J.B, Adilov S. Effect of cotton fertilizer rate on soil agrochemical properties. https://www.researchgate.net/profile/Nokisbaj-Akimov/publication/367090883_2022-3-2-sany/links/63c110754804ba12ffc1ce18/2022-3-2-sany.pdf#page=27*