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DIAGNOSTIC INDICES OF GARABAGH PLAIN SOILS

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Abstract. The broad information about grey-meadow soils of the Garabagh plain situating in the Kur-Araz lowland which is a main agricultural zone was given, the research consequences performed in the soils of the selected experimental area of the plain were registered, some diagnostic indices of the same soils were fixed. The investigations indicate that an area of the salinized soils increased under negative influence of the antropoghenic factors, phyusico-chemical properties of the degraded soils deteriorated. The humus quantity vibrates by 0,49-2,18 %, calcareous – 7,28-8,97 %, pH value -7,75-8,42 in the same soils.

Key words: grey-meadow soils, subsoil waters, salinization, productivity, fertility

INTRODUCTION

As a result of the agrarian reforms performed in the country lately the productivity obtained from agricultural plants offers all necessary facilities for the food richness formation. In connection of giving the soils to the private property the human's regard for land changed fundamentally. But lately the ecological environment disorder led to decrease and degradation of the lands good for agriculture, the water-physical characters of the soils which were exposed to degradation under an influence of the natural and anthropogenic factors deteriorated in the republic. Consequently the productivity obtained from agricultural plants became diminished. The investicate that the salinization, solonetzification and erosion processes are negatively influencing on lands fertility in the agricultural zones of the republic. The soils in the Kur-Araz lowland where the main agricultural crops are produced mostly exposed to salinization [1].

Besides the other measure connected with the land "In State Program about reliable provision of the population with foodstuffs in the Republic of Azerbaijan in 2005-2014" by the president I.Aliev, improvement of use from soil and natural pastures, definite of the salinized, solonetzificated and degraded lands, increase of the soils fertility were taken account and the works were realizing in this direction. At present the human's economical activity was a reason for enlargement of the anthropogenic lands area [2]. An aim of the research is to determine some diagnostic indices of the experimental soils in the Garabagh plain.

OBJECT AND METHOD

The researches have been performed in the municipal lands of the Salmanbaili village in Agcabadi of the Garabagh plain, the zone was 2,4 hectares and the soil samples have been taken from the characteristic plots. The chemical analyses have been fulfilled according to the method widely expanded in the republic. The coordinates of the land sections have put by CPS [3].

RESULTS AND DISCUSSION

Beginning from the 90th years performance of the agrarian policy in agriculture caused fundamental increase and the human's regard for land changed. But lately the ecological environment disorder led to decrease of the fit soils for agriculture. The Kur-Araz lowland is a principal agricultural zone in the republic, and it is a special region for the good natural-climate and farming condition, soil pecularities. The lowland area consists of 2,2000000 hectares and 60 % of the lands are medium and strongly salinized [4]. The subsoil waters depth and mineralization are various. A mineralization rate of the subsoil waters at the foothill parts is 2-5 g/l, but its increase towards center is observed. There are hydrocal- careous, sulphate and

chlorine types in the lowland. Some scientists (V.Volobuyev, M. Abduyev, I.Iskandarov, M. Babayev, G. Mammadov, N. Mikayilov, G. Azizov, M.Mustafayev, E. Gurbanov and ofhers) performed capacious researches in the valleys.

There are sodium – sulphate solonchak soils in the plain, the same soils tighten while soils are dried, the cracks are formed on the surface, and the water badly leaks. V.R.Volobuyev had special services in generalization of works performed in the Kur-Araz lowland. The author compiled saline, soil- geochemical maps which reflect separate components of the salt content in the lands [5]. We should note that the hardest state for the slope depth of subsoil waters is in Mugan- Salyan, Shirvan, Garabagh of the Kur-Araz lowland and in the Mil massives. Mineralization of subsoil waters in these massives is higher. Here, the zones where the subsoil waters with mineralization more than 3,0 g/l occupy 30-50 % of the generally irrigated area. The Garabagh plain in the Kur-Araz lowland is situated between the Kur river and little Caucasus mountains and includes the arid, steppe climate zone. The plain soils are mainly used under agricultural plants. The Garabagh plain occupies 324,7 000 hectares of the zone. The soils in the Garabagh plain was investigated by some researchers(M.P. Babayev, G.M. Mammadov, G.Z. Azizov and others).

The plain climate was initially studied by I.B.Figurovsky [6], then by A.M.Shiklinisky [7]. The plants cover was weakly developed in the plain. The plants in the zone consist of the mixed grass cultures. The organic residue collects little because of the highest mineralization of these plants in connection with the hot and arid climate. The subsoil water level and mineralization are various, the composition is calcareous, sodium-calcareous and sulphate. The calcareous subsoil waters are found in the south –eastern part of the plain. The subsoil water level in the plain is very different depending on irrigation method and rivers flood [8].

A consequence of the long-term researches indicate that salinization, solonetzification and other process in the same lands because of incorrect fulfillment of the agrotechnical and agromeliorative measures in the soils under the agricultural plants of the Garabagh plain were a reason for deterioration of their water-physical characters. And this led to disorder of mineral nutrition and substances exchange in cultured plants, consequently productivity of agricultural plants reduces.

A main zonal type is considered grey soils in the Garabagh plain. An average annual temperature in the zone with grey solis is 13,5-14,6^0 and that's why it possesses arid semidesert and dry steppe climate. A temperature of the hot moths is much higher (23,0-25,5^0) caragana, caragana-wormwood and wormwood- ephemer plant groupping are characteristic for the zones with grey soils. These soils are formed on the main soilforming rocks like aluvial, proluvial and ancient Caspean salty deposits. The same soils are weakly provided with humus. The grey lands occupy a central aluvial part of the plain. The humus quantity is 2-3 % in these soils.

As it is known the humus content possesses a great role in soil fertility formation, plant growing and development. A role of humus is great in formation of ecological condition good for the agricultural plants. Humus isn't only a chemical and biological and also an ecological conception. Humus substance provides an alternation of the nutrients assimilation by the plant. A main nutrition element of plants – nitrogen, phosphoruc, sulphur, calcium and etc. gather in its structure [9].

A main part of humus is gathered on the upper horizons and 0,3-0,6 % at one metre depth. But sometimes humus quantity is more than 1 %. Grey soils include the high calcareous soils line. The carbonates quantity grows towards bottom along pro-

file and reaches the highest value on the iluvial- calcareous horizons.

The absorbing capacity is characterized by the medium indices in grey soils. A quantity of absorbed cations isn't more than 18-20(25) mg-ekv in 100 grams of soil. 85-80 % of absorbed bases are calsium and magnesium Absorbed natrium forms 8-15 % of the absorbing capacity. These soils usually possess alkaline reaction.

Since long the irrigative grey soils were investigated by Sh. G.Hasanov, M.P.Babayev. dependent debris of irrigative waters play a great role in grey soils formation. The weathering process becomes stronger, increase of the quantity and absorbed capacity of the colloid particles occurs on the upper layer of these soils under irrigation influence in some researchers opinion[10].

Taking into account the soil solution reaction for the plants development is considered important. Increase of the soil alkalinity or acidity negatively infuences on plant growing and development.. pH quantity changed by - 7,7-8,4 according to the results of the researches in the experimental lands. Grey-brown, grey and meadow soils spread depending on climate, plant cover, geomorphological and hydrogeological features in the plain.

The solonetizized kinds of grey-meadow soils are met in the Garabagh plain. The solonetizized meadow soils spread in the different areas as a result of the salt natural leaching. The soil mostly exposed to salinization in the not artificial arained areas of the Garabagh irrigative zones. In connection with the Upper Garabagh canal construction an area of the irrigative soils has been enlarged, an infiltration process of soils has strengthened.

At present the human's farming activity is also a reason for enlargement of soils antropoghenic area. The antropoghenic effect transformed into a main factor in specific soil types formation under the new ecological condition in the regions exposed to a strong antropoghenic, especially in the urban landscapes. So, the fertility of the soils fit for forests, pastures and sowing disturbs as a result of the human's antropoghenic, unscientific and irrational farming activity in the mountainous regions. Such soils degraded and remaind beyond from agricultural use. Generally. The men's farming activity and antropohenic besides natural factors play a great role in soils demolition[11].

As a result of the negative impact of the antropoghenic factors the salinized soil areas grew year by year, but a sowing area diminished in the plain zone. The researches indicate that the soils degraded and their physico-chemical characters mostly deteriorated under a negative influence of the antropoghenic factors in the irrigated soil areas of the plain zone.

The researches showed that distribution of soils for salinization and solonetzification mostly exposed to salinization in the Kur-Araz lowland where 80-85 % of the main agricultural crops were grown and produced. It was known that 13,4 % of soils required fulfillment of the meliorative measures are salinized soils to an average, strong and very strong degree in the Garabagh massive.

Aghjabadi is situated in the west part of the Mil plain in the Kur-Araz lowland. The summer is dry, the climate is mild-warm semi desert and arid steppe. Here the summer is very hot and weak moist. A maximum temperature is observed in the summer months.

It was determined that an average annual temperature of the land surface is 18^0C in the district zone. Increase of temperature in the summer months makes a good circumstance for the agricultural plants development. A quantity of the annual rainfall is 332 mm in the region. Decrease of the atmospheric precipitations in the summer and autumn months creates a need for the agricultural plants irrigation. An evaporation from the soil surface is 980 mm in a year. Here the winds are dom-

inant in west and east directions. An average annual rate isn't more than 1,8 m^3/second. An analysis of the climate parameters in the region indicates that there is a good circumstance for the agricultural plants development.

The irrigative water sources in the Aghjabadi district are the Upper Garabagh canal beginning from Mingachevir water storehouse, Gargar river, subsoil waters by 755 subartesian wells with 22 m^3/second of total expence. The longterm onservations show that the water provision of the region is wholly ensured in the multi-water periods. The areas where a location depth of subsoil waters is 0,5-3,0 m on the surface occupy an are more than 35000 hectares. The subsoil waters mineralization changes by 14-50 g/l.

Table 1 - Main climate indications of the Aghjabadi region.

Indications	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	İl
Total Radiation quantity, kkal/cm^2	5,0	6,4	9,4	11,9	13,9	18,1	17,8	16,5	12,4	8,8	5,9	4,6	130,7
Radiation Balance quantity, kkal/cm^2	0,1	1,4	3,4	4,8	5,5	7,7	7,4	6,6	4,7	2,4	1,0	0,0	45,0
Air average temperature	1,8	3,8	7,0	12,6	19,1	23,3	26,0	25,6	20,8	15,1	8,8	3,7	14,0
Average ansolute minimum temperature of air	-8	-7	-4	0	7	12	14	14	9	5	-2	-8	-9
Absolute temperature of air	-24	-18	-12	-3	2	8	11	9	2	-4	-11	-22	-24
Absolute maximum temperature of air	22	27	34	34	38	40	41	40	37	35	28	26	41
Average temperature of land surface	2	5	9	16	25	30	34	32	25	18	10	4	18

During the research the least water capacity, bulky weight, special weight, porosity of soil hav e been studied. As is seen from Table 2 the least water capacity is distributed towards depth at 0-100 cm layer. The bulky weight is 1,28-1,42 g/cm^3, the special weight is 1,47-2,60 g/cm^3. But the porosity is 43,0-49,9 % on horizons.

The hygroscopic humidity, total nitrogen, pH, CO_2, $CaCO_3$ and etc. have been studied in the selected experimental area to investigate a diagnostic situation of the plain soils. The obtained results are show on the table. It was defined that the soils of the experimental areas are unsalinized, weak, medium and strong salinized. It is seen from the table that the hygroscopic humidity possesses different marks on the genetic layers depending on soil granulometric structure. According to the chemical analysis consequences of the bright grey- meadow lands we can say that the

humus quantity on the ploughing layer changes by 1,87-2,18 % . Increase of humus towards low layers can be explained by irrigation of these soils long ago, and a gradual change of the genetic layers. A quantity of total nitrogen changes by 0,085-0,166 % on the ploughing layer, but underploughing layer by 0,004-0,019 % depending on humus quantity. Calcareous is 5,55-8,80 % on the ploughing layer of these soils. But it changes by a little difference on the low horizons.

Table 2 - Some indices of the experimental area soils

Soil layer, cm	The least water capacity of soil, %	Bulky weight, g/cm^3	Special weight, g/cm^3	Porosity, %
0-10	30,18	1,40	2,47	43,3
10-20	29,88	1,28	2,49	48,6
20-30	29,65	1,31	2,51	47,8
30-40	29,12	1,40	2,55	45,1
40-50	28,52	1,42	2,58	45,0
50-60	28,04	1,30	2,60	46,5
60-70	27,48	1,42	2,49	43,0
70-80	26,94	1,40	2,50	44,0
80-90	26,08	1,29	2,59	50,2
90-100	25,10	1,40	2,61	46,4
0-100	28,10	1,38	2,60	46,9

Table 3- Chemical analysis consequences of bright grey-meadow soils (by percentage in the absotute dryland

Number of the section	Layers,cm	Hygroscopik humidity, %	Humus, %	Total nitrogen, %	pH in water solution	$CaCO_3$, %
Clayey, weak solonetzificated bright grey-meadow soils						
A-5	0-24	5.43	2.18	0.166	7.75	8.55
	24-61	5.67	1.91	0.121	7.82	7.28
	61-97	5.30	1.30	0.006	8.00	8.24
	97-156	4.75	0.71	0.004	8.20	8.12
Heavy loamy, average solonetzificated bright grey- meadow soils						
A-6	0-23	5.38	1.87	0.085	8.18	8.80
	23-59	4.82	0.98	0.072	8.25	8.90
	59-101	4.42	0.62	0.019	8.42	8.62
	101-172	4.25	0.49		8.32	8.97

CONCLUSION

The researches indicated that the humus quantity in the experimental area soils were 1,87-2,18 % layer, total nitrogen- 0,085-0,166 % on the ploughing layer, 0,56-1,86 % 0.004-0.019 %, but calcareous 8,55-8,80 %, 7,28-8,90 % on the low layers.

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ТҮЙІН

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ҚАРАБАҚ ДАЛАСЫ ТОПЫРАҒЫНЫҢ ДИАГНОСТИКАЛЫҚ КӨРСЕТКІШТЕРІ

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Мақалада Құра-Араз ойпатының негізгі ауыл шаруашылығы аймағында орналасқан Қарабақ даласының сұр-шалғынды топырағы туралы толық ақпарат берілін, даланың таңдалған учаскесінде зерттелген нәтижелері аталып, осы топырақтың кейбір диагностикалық көрсеткіштері анықталды. Зерттеулер көрсеткендей, антропогендік факторлардың теріс әсерінің нәтижесінде Қарабақ даласының аумағындағы тұздалған топырақ учаскесі ұлғайды, азып-тозған топырақтың физикалық-химиялық қасиеттері нашарлады. Бұл топырақтағы гумус мөлшері 0,49-2,18 %, карбонаттылығы-7,28-8,97 %, ал pH көрсеткіштері-7,75-8,42 шегінде ауытқиды.

Түйінді сөздер: антропоген, жерасты суларына, өнімділігі, құнарлылығы

РЕЗЮМЕ

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ДИАГНОСТИЧЕСКИЕ ПОКАЗАТЕЛИ ПОЧВ КАРАБАХСКОЙ СТЕПИ

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Дана обширная информация о серо-луговых почвах Карабахской равнины, расположенных в Кура-Аразской низменности, которая является основной сельскохозяйственной зоной. Представлены результаты исследований, выполненные на почвах выбранного опытного участка равнины, приведены некоторые диагностические показатели данных почв. Проведенные исследования свидетельствуют о том, что площадь засоленных почв увеличилась под негативным влиянием антропогенных факторов, ухудшились физико-химические свойства деградированных почв. Количество гумуса в этих почвах колеблется в пределах 0,49-2,18 %, карбонатов - 7,28-8,97 %, pH-7,75-8,42.

Ключевые слова: серо-луговые почвы, грунтовые воды, засоление, продуктивность, плодородие.