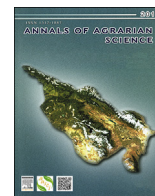




Contents lists available at ScienceDirect

## Annals of Agrarian Science

journal homepage: <http://www.journals.elsevier.com/annals-of-agrarian-science>

## Ecological-genetically peculiarities and diagnostics of the cultivated urban soils in the Central Botanical Garden of NAS of Azerbaijan

V.H. Hasanov\*, S.Z. Mammadova, P.V. Alieva

*Institute of Soil Science and Agrochemistry of National Academy of Science of Azerbaijan, 5, Arif Str., Baku, AZ1000, Azerbaijan*

### ARTICLE INFO

#### Article history:

Received 7 June 2016

Accepted 22 October 2016

Available online xxx

#### Keywords:

Cultivated urban soils

Humus

Grey-brown soils

Soil profile

Illuvial-carbonate horizon

### ABSTRACT

The soil forming process leaks under the conditions of semidesert, dry and hot climate as a result of what is formed weak developed saline – salty grey-brown soils in the research object. In the virgin land the humic – accumulative horizons of the grey-brown soils are weakly developed and capacity doesn't rise 15–20 sm. The humus content on the upper horizons is little and forms 0,9–1,1%, but nitrogen – 0,07–0,09%. The high calcareous soils, CaCO<sub>3</sub> content over the whole profile is 19–26%. A quantity of the absorbing capacity is also little and forms 16–18 m-ekv per 100 g of soil on the upper horizons. The long (more than 70 years) intensive use of the garden territory under various green grove and performance of the scientific – research works and lines of the agrotechnical measures (deep tillage, regular irrigation, application of manure and mineral fertilizers) have been strongly represented in formation of the morphological profile from urban soils and their diagnostic indices. Enough powerful cultivated layer (AUa = 40–50 sm) is formed with the granular – cloddy structure where humus content is 2,4–2,7%, nitrogen – 0,20–0,22%, which aren't characteristic with grey-brown soils in Absheron. Maximal content of carbonates (CaCO<sub>3</sub> = 18–20%) and clayey fractions (<0.01 mm = 40–50%) are noted in the mean part of the soil profile, as a result of leaching from upper layer. The cultivated urban soils are distinguished with enough increased capacity of absorption (23–25 mg-ekv) and profile weight is leached from light soluble salts (dense residue 0.088–0.230%).

© 2017 Production and hosting by Elsevier B.V. on behalf of Agricultural University of Georgia. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

### 1. Introduction

Study of the urban territories by the scientists is enough young direction of our science. As is known the soils in the urban territories have been significantly ignored by the soil scientists. The problem solution of the natural environment guarding under city construction exposed to other meaning of the soil role and soil cover in support of the human's life stability is accompanied by significant land alienation, often productive under urban development and industrial objects, area of such lands grow everywhere [1,2].

The first notion “urban soils” was introduced by J. G. Bockheim [3]. The urban soils have been determined as “soil material maintaining anthropogenic layer of the non-agricultural origin with thickness more than 50 sm established by means of mixing, filling or pollution of land layer on the urban and natural territories”. At

present an intensive elaboration of the theoretical bases, doctrine about urban ecosystems and soil role in them is observed [4].

Recently the significant scientific-practical researches in connection with the urbanization process development in the large cities, soils in the parks, gardens and other territories under green groves, changed with the extreme strong anthropogenic effects as “special urban soils” have been performed on an international scale, especially in USA [3], England [5,6], German [7], Russia Federation [8–12] and others. The preliminary nomenclature and taxonomic units of the soil-ecological classification are composed, the main morphogenetic properties and diagnostic indices are revealed on the basis of soil-ecological researches in the urban soil of the parks, gardens and other green groves.

### 2. Objective and methods

The central Botanical Garden is situated in the south-western of Baku, in Bayil amphitheatre. The garden territory borders on Patamdart highway in the north and north-west, on the lane of Honorable Avenue in the south and south east.

\* Corresponding author.

E-mail address: [vilayet.hesenov@mail.ru](mailto:vilayet.hesenov@mail.ru) (V.H. Hasanov).

Peer review under responsibility of Journal Annals of Agrarian Science.

<http://dx.doi.org/10.1016/j.aasci.2017.02.008>

1512-1887/© 2017 Production and hosting by Elsevier B.V. on behalf of Agricultural University of Georgia. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

**Table 1**  
Main physico-chemical indices of grey-brown and cultivated urban soils.

№	Horizon and depth, sm	Humus, %	Nitrogen, %	C:N	CaCO <sub>3</sub> , %	pH water suspension	Absorbing bases m-ekv per 100q of soil		
							Totality	Ca	Mg
Grey-brown cultivated urban soils									
2	AU <sub>a</sub> 0-30	2.69	0.208	6.5	16.8	7.9	23.5	16.0	7.5
	AU <sub>a</sub> 30-48	1.52	0.135	6.6	17.7	8.0	20.2	12.3	7.9
	B 48-87	0.84	0.072	5.5	18.4	8.2	22.8	14.6	8.2
	CI 87-128	0.34	No	–	21.4	8.4	18.4	12.8	5.6
	CII 128-155	0.28	no	–	20.7	8.4	19.8	12.2	7.6
3	AU <sub>a</sub> 0-24	2.43	0.214	7.0	14.5	7.8	21.4	15.2	6.2
	AU <sub>a</sub> 24-46	1.46	0.142	5.8	18.8	7.9	20.8	14.5	6.3
	B 46-75	0.72	0.064	6.5	20.5	8.2	18.4	11.0	7.4
	CI 75-120	0.38	no	–	19.7	8.4	23.6	13.9	9.7
	CII 120-170	0.42	no	–	18.8	8.5	24.7	14.7	10.0
5	AU <sub>a</sub> 0-26	2.58	0.214	7.0	11.8	7.9	25.7	18.6	7.1
	AU <sub>a</sub> 26-42	1.55	0.135	6.6	13.1	8.2	26.2	13.3	6.9
	B 42-58	1.03	0.102	6.0	15.3	8.3	23.0	15.7	7.3
	B/C 58-85	0.69	no	–	16.2	8.5	21.4	14.2	7.2
	C <sub>s</sub> 85-125	0.43	no.	–	15.0	8.7	17.8	11.3	8.4
Grey-brown weak cultivated urban soils									
8	AU <sub>a</sub> 0-20	1.65	0.154	5.9	29.9	7.8	19.2	13.4	5.5
	AU <sub>a</sub> 20-31	1.02	0.118	5.0	24.6	7.9	18.9	12.7	6.5
	B 31-72	0.78	0.065	5.8	20.9	8.1	19.0	13.2	5.8
	CI 72-120	0.32	no	–	13.9	8.0	17.8	11.8	6.0
	CII 120-150	0.30	no	–	16.4	7.9	16.7	10.2	6.5
11	AU <sub>a</sub> 0-21	1.72	0.126	6.2	15.2	8.0	18.1	11.8	7.3
	AU <sub>a</sub> 21-39	1.53	0.105	6.6	18.3	8.1	16.2	10.0	6.2
	B 39-57	1.03	0.062	6.0	21.8	8.3	19.0	12.7	0.4
	CI 57-92	0.43	no	–	15.3	8.5	15.2	9.1	6.1
	CII 92-126	0.43	no	–	15.3	8.5	15.2	8.7	6.5
Grey-brown saline – solonchak soils									
17	AY <sub>v</sub> 0-18	0.95	0.071	7.9	19.3	8.0	16.6	11.2	5.4
	B/C 18-35	0.45	0.036	7.3	20.6	8.1	15.2	10.1	5.1
	C 35-52	0.38	no	–	28.0	8.3	16.8	9.8	7.0
	C/D 52-72	0.27	no	–	26.3	8.3	15.9	8.7	7.2
18	AY <sub>v</sub> 0-10	0.95	0.091	6.9	24.7	8.0	17.8	11.6	6.2
	A/B 10-30	0.76	0.065	6.9	23.9	8.2	20.3	12.5	7.8
	B/C <sub>s</sub> 30-54	0.55	0.041	7.8	26.7	8.3	19.6	11.5	8.1
	C <sub>s</sub> 54-83	0.27	no	–	33.7	8.4	19.2	10.4	8.8

In geomorphological respect this territory is a part of the south-eastern flexure in the Absheron peninsula and is formed by the products of the quarter ancient sedimentary Caspian deposits. The principal two parts are clearly distinguished in the relief of the given locality: central mansion-almost even relief, litter shell limestone and sandstone, covered with their weathering products, and also contemporary Aeolian deposits; south-east-distinguishing with the strong denudation and dissection in a form of cult packer sheet, going out from shallow fine debris where o slope of locality reaches 25-30° on the large part of the territory.

The soil-forming process leaks under the conditions of the semidesert dry and hot climate with the middle yearly temperature of the air 13,7–14,0 °C. The annual quantity of the atmospheric precipitations doesn't rise 200–300 mm, their maximum falls of the autumn-winter period. The dominating north winds with often refresh the surface fine earthy stratum by means of windward render an available effect on soil forming process.

The central Botanical Garden of ANAS was founded in 1945 (area is 41,4 ha) and where the experimental-filed and scientific-research works were performed more than 70 years. As a result of the anthropogenic effects, peculiarly performed long irrigative greening and other agrotechnical measures, the morphogenetic profile and diagnostic index of the cultivated soils significantly vary [13,14]. However such types of the soils as cultivated “urbanization”

of the Central Botanical Garden are weakly investigated. In this connection, during 2013–2015 on the territory of this garden the complex field soil and cameral laboratorial researches were carried out. On the basis of the carried out complex investigations the detailed soil maps of the Central Botanical Garden (S 1:2000) have been compiled, the soil nomenclature has been improved and diagnostic indices have been revealed. They have been fixed as urban soils of the new type “urbanization”.

A detailed mapping was performed in the field soil works where more than 20 soil sections were applied (at the depth 1,0–1,5 m) with the definition of their coordinates by means of the CPS apparatus in the research object. The following analyses have been worked out in the soil samples: granulometric composition – by a method of grinding with Pyrophosphate sodium solution, humus content and nitrogen content by I.V.Turin's method, pH (water) – potentiometer, absorbing cations (Ca + Mg) – by D.V.Ivanov, carbonates – calcimeter, dense residue and light dissolving salts – by a classical method under E.V.Arinushkin's leadership.

### 3. Results and analysis

The soil in the garden and parks from Baku are weakly studied. There is preliminary information about the soils in Baku as an example of the Central Botanical Garden of ANAS only in Refs. [15]

Download English Version:

<https://daneshyari.com/en/article/7228723>

Download Persian Version:

<https://daneshyari.com/article/7228723>

[Daneshyari.com](https://daneshyari.com)