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## CHANGES IN THE SOIL-BONITER INDEX AND AGROPHYSICAL PROPERTIES OF URBANIZED SOILS OF AGROECOSYSTEMS AS A RESULT OF FLATTENING WITH TURMUSHEZEM

*Buzylev A. V.*

*Russian State Agrarian University – Moscow Timiryazev Agricultural Academy,  
Moscow, Russia*

**Keywords:** agroecological assessment, soil-ecological quality, agrophysical properties of soils, filling with eroded soils, turmushezem.

**Abstract.** The article discusses the change in the quality of the soil cover in the bonitet score, as well as the basic agroecological properties of the upper root-inhabited horizon of urbanized sod-podzolic soils of the agroecological stationary of the Field Experimental Station of the Russian State Agrarian University – Moscow Agricultural Academy named after K.A. Timiryazev as a result of measures to improve the melioration and flatten the relief with eroded contaminated soils removed from the upper horizon (0-15 cm) of the equestrian field.

## ИЗМЕНЕНИЕ БОНИТЕТА И АГРОФИЗИЧЕСКИХ СВОЙСТВ УРБАНИЗИРОВАННЫХ ПОЧВ АГРОЭКОСИСТЕМЫ В РЕЗУЛЬТАТЕ ВЫПОЛАЖИВАНИЯ ТУРМУШЕЗЁМОМ

*Бузылёв А.В.*

*Российский государственный аграрный университет – Московская  
сельскохозяйственная академия имени К.А. Тимирязева, Москва, Россия*

**Ключевые слова:** агроэкологическая оценка, почвенно-экологический бонитет, агрофизические свойства почв, засыпка эродированными грунтами, турмушезём.

**Аннотация.** В статье рассматривается изменение качества почвенного покрова в баллах бонитета, а также базовых агроэкологических свойств верхнего корнеобитаемого горизонта урбанизированных дерново-подзолистых почв агроэкологического стационара Полевой Опытной Станции РГАУ-МСХА имени К.А. Тимирязева в результате проведения мероприятий по мелиоративному улучшению и выполаживанию рельефа эродированными загрязнёнными грунтами, снятыми с верхнего горизонта (0-15 см) конноспортивного поля.

Leading agricultural producers are faced with the problem of pasture soil cover degradation associated with exceeding the maximum grazing load of farm animals. The final stage of these processes is pasture soil erosion, easily identified by the almost complete absence of vegetation, strong compaction and destruction of the soil structure [1].

With timely diagnostics of degradation processes of pasture ecosystems, it is possible and natural to develop soil protection measures. With complete erosion, the rationality of their use tends to zero, especially if the object is located in a large city. Due to the impossibility of further use, a decision was made to remove a 25-centimeter layer of soil and its subsequent use as soil for smoothing out the bright forms of mesorelief (depressions from 5 to 35 cm) of the experimental plot of

the agroecological experimental field of the Timiryazev Academy with an area of 2.3 hectares (Fig. 1) [2].

The soil was applied in October-November by continuous scattering, followed by leveling and plowing to a depth of 20-23 cm and repeated early spring plowing. Soil sampling was carried out 6 months before application and 6 months after application of turmushezem soils according to GOST R 58595-2019. The controlled agroecological parameters were: pH of water and salt extract, ammonium and nitrite nitrogen, mobile phosphorus, exchangeable potassium, organic carbon, soil density, stoniness and structural condition. The soil-ecological bonitet (SAB) was calculated using the integrated agroecological assessment system «RASKAZ».



Fig. 1. Turmushezem application area (Mapbox, 2024)

In the first spring after the application of turmushezem, surface water was observed on 63% of the field area, which had not been observed before. Also, particles of household waste were observed everywhere on the surface.

Preliminary assessment showed normal soil cover condition (SAB 42 points, V class of quality) [3]. Analysis conducted after the activities on adding degraded soil showed a significant decrease in soil quality to 22 points (III class of quality), which corresponds to conditionally unsuitable soils.

Agroecological assessment revealed positive signs (table 1), which include a reliable increase in soil acidity (0.6-0.8 mol/l) from neutral to slightly acidic reaction of the environment and a slight increase in mobile forms of phosphorus (+4%) and exchangeable potassium. (+1,5%) [4].

There is a noticeable compaction of the arable horizon from medium to very dense with a significant deterioration in the structural state of the soil in terms of the content of agronomically valuable aggregates to poor.

Critical parameters include an increase in the rockiness of the arable horizon from the absence of rocks to medium rocky soils.

Table 1. Changes in agroecological soil parameters.

Parameter	pH <sub>water</sub>	pH <sub>KCl</sub>	NH <sub>4</sub>	NO <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	C <sub>organic</sub>	Soil porosity	Rockiness	Soil units 0,25-10 mm
	mol/l		mg/100g				%	g/sm <sub>3</sub>	m <sup>3</sup> /ha	%
Before	7.2 ±0.1	6.7 ±0.1	7.9 ±0.2	3.7 ±0.2	296.4 ±25.3	181.1 ±12.4	3.9 ±0.2	1.27 ±0.2	2.5 ±0.7	64 ±12.0
After	6.4 ±0.1	6.1 ±0.1	7.9 ±0.2	3.7 ±0.2	307.2 ±27.1	178.6 ±14.0	3.6 ±0.2	1.49 ±0.2	37.6 ±12.3	11 ±8.0

Based on the conducted research with a significant drop in the soil quality of the agroecological experimental field by 20 points, it can be demonstrated that there is a need for urgent development and implementation of measures to restore the soil cover and prevent the use of turmushezem soils in agroecosystems.

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<b>Бузылёв Алексей Вячеславович</b> – старший преподаватель кафедры экологии	<b>Buzylev Aleksey Vyacheslavovich</b> – senior lecturer department of ecology
axe@rgau-msha.ru	

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