Specificity of determining of the organic matter content in the Rostov agglomeration natural soils

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Determination of the organic matter content is an important stage in the comprehensive study of the soil, which makes it possible to understand its genesis and properties, as well as ways for fertility increasing. Now there are several soil organic matter determination procedures, or rather, their modifications. Analysis speed, results reproducibility, and accuracy are key aspects in finding the optimum procedure for laboratory tests.

Therefore, the purpose of this work is to identify the features of determining the organic matter content of natural soils of the Rostov agglomeration applying two different analytical procedures. These methods are based on qualitatively different approaches to the organic carbon compounds determination. One of the procedures is the B.A. Nikitin's modifications of methods that involve a wet combustion of the organic matter with a mixture of potassium dichromate and sulfuric acid at about 150 °C in a drying oven. The residual dichromate is determined by the optical density measured on a spectrophotometer at a wavelength of 590 nm [1]. Other procedure is high temperature catalytically assisted combustion on an analyzer of total organic carbon TOC-L CPN Shimadzu. The TOC (total organic carbon) value is found by a differential method, which is described by the following equation: $TOC = TC - IC$, where TC is total carbon and IC is inorganic carbon [2].

Calcic Chernozem were the object of this study. The soil sampling was carried out in tenfold repetition from the upper 10 cm for each of the five monitoring plots. Such sampling procedure enabled the performance of statistical processing of the data and to exclude the vary factor of the content of many indicators in the surface samples.

Using of both procedures have shown that there is no significant difference in total carbon content with a sample of $N = 100$ and a significance level of 0.05. The average organic carbon content determined by Nikitin's method was 3.54 ± 0.98 . The average organic carbon content determined by carbon analyzer was 3.90 ± 1.01 . These tests were shown the equivalence of the compared procedures and high results reproducibility of it. However, the carbon analyzer procedure provides a more complete combustion of carbon. Also the high-temperature catalytically assisted combustion allows observing the principles of an ergonomic approach: the amount of reagents and time for examining the sample are significantly reduced, errors associated with the analyst's actions are minimized. There is no negative effect of the vapors of the sulfuric acid on a person as well.

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