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Water-soluble organic matter and enzymatic activity of urban soils of Rostov agglomeration

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Soil water-soluble organic matter (WSOM) is the most dynamic and least stable component of humus. It takes a direct part both in leading soil processes and in the formation of effective soil fertility. Its components are involved in the creation of a water-resistant structure, also exhibit physiological activity, and be of service as energy material by microorganisms. The total content of organic matter in the soils of the Rostov agglomeration varies widely: from 1.5 to 7.0%. Long-term studies of soils of the Rostov agglomeration forest-park zones showed that the organic carbon content in these soils increases under tree vegetation. This is due to changes in microclimate conditions and the associated longer period of vegetation of herbaceous vegetation. The WSOM content was obtained by summing the results of cold and hot extraction in natural soils. Its gradually decreases with depth repeating the profile dynamics of the organic carbon content in general. The surface horizons of native chernozems in a forest park and in a virgin land have the highest content of WSOM. It can be concluded that the WSOM pool is directly proportional to the stock of incoming plant residues. The maximum of extracellular enzymes activity was obtained in upper most biogenic soil horizons in the natural city soils. The highest activity was record for the enzyme, which is responsible for the nitrogen cycle (arginine-aminopeptidase (Agr)) and for the phosphorus cycle (acid phosphatase (Pho)). The enzymes activity decreases down the soil profile.

For anthropogenically transformed soils, the WSOM profile distribution indicates a peculiar two-member structure of soil profile. The transformed upper urbic horizons was demonstrate the absence of any patterns in its distribution. In the buried horizons of Technosols, were have the same profile trends and the same absolute values of the organic carbon content such us presented in native chernozems. Despite the high humus content in natural soils (5–7%), most of it is strongly associated with calcium ions. As a result, WSOM has values not exceeding 0.14% of the soil as a whole, or 4% in terms of organic carbon. For the urban horizons of anthropogenically transformed soils, WSOM values are not exceeding 0.04% of the soil, or about 2% in terms of organic carbon. The inversions of enzyme activity are often observed in anthropogenically transformed soils. The enzymatic activity is higher in buried humus-accumulative horizons of urbostratozems than in overlying horizons of the urbic.

