CARBON SEQUESTRATION PECULIARITIES DEPENDING ON SOIL TYPE IN BOREAL PEDOCLIMATIC CONDITIONS

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Abstract

The pedoecological approach to soil conservation strategies is based on many-featured analyses of its carbon sequestration peculiarities depending on different soil properties, land use technologies and macroclimatic conditions of the region. To be efficient in the struggle against soil degradation, a better understanding about the soil's annual carbon cycling and humus balance is required. The main objective of this research is to indicate how to prevent degradation of soil productivity, conserving at the same time its environment protective ability.

In the analysis of carbon sequestration the soil matrix tables of Estonian post- and synlithogenic mineral soils were used. The main parameters in this analysis were the humus cover fabric and thickness, carbon percentage and pools in different layers, and humus cover types depending on the characteristics of land use. For the benchmarks were taken carbon cycling parameters of automorphic postlithogenic soils - *Albeluvisols, Cambisols* and *Luvisols.*

Soil degradation features in connection with soil humus status were elucidated for eroded synlithogenic *Albeluvisols, Cambisols* and *Luvisols.* In these soils, depending on the land use technology, the carbon percentage in humus cover has decreased from 38 to 55 % and humus pools relatively much more, from 43 to 62 % or to 35-55 Mg ha^{-1}. At the same time on approximately 25 % of eroded arable area the buried pools of soil organic carbon (practically not participating in biological processes) have reached from 60 to 200 Mg ha^{-1}.

To certain arable soils *(Leptosols, Skeletic Cambisols)* the degradation of humus status caused by the use of unsuitable soil tillage technology is characteristic. Although on relatively widely distributed (totally 18,5 %) arable *Gleysols* carbon cycling is influenced by soil calcareousness and texture, it is controlled mainly by the moisture conditions. Consequently, the carbon cycling of *Gleysols* is controllable by their drainage stage. Much more complicated is carbon cycling on *Fluvisols.* There are many environmentally important reasons, which require leaving these synlithogenic soils into natural stage.

For each postlithogenic mineral soil the soil organic carbon retaining capacity and functioning activity is characteristic, depending on soil calcareousness, texture and management. The best way for conserving soil organic carbon parameters in equilibrated status (which corresponds with soil functioning peculiarities) is its ecologically sound (taking into account soil properties) management. On synlithogenic soils the regularities and interrelations of geo- and pedoprocesses must be very carefully taken into consideration.

Key words: carbon retaining capacity, soil degradation, soil erosion, soil humus status, soil matrix tables, soil organic carbon.