Geophysical Research Abstracts,
Vol. 11, EGU2009-2289-1, 2009
EGU General Assembly 2009

Some physicochemical properties of surface layer soils shelterbelts in agricultural landscape

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Shelterbelts belong to very efficient biogeochemical barriers. They decrease the migration of chemical compounds between ecosystems.

The investigations were carried out in the Chlapowski's Agroecological Park in Turew situated 40 km South-West of Poznań, Poland. This area is located on loamy soils, which contains 70% cultivated fields and 14% shelterbelts and small afforestations. The shelterbelts represent different ages and the content of plants as well as humus quantity in surface layer.

The first one is 100-year-old shelterbelt, where predominant species is *Crataegus monogyna* Jacq., *Quercus rober* L., and *Fraxinus excelsior* (L.) and is characterized by a well-developed humus level. The other one is 14-year-old shelterbelt. It includes 13 species of trees and revealed a small amount of humus.

The soil under both shelterbelts is mineral, grey-brown podzolic in surface layer compound from light loamy sands and weakly loamy sands.

The soil samples were taken from surface layer (0-20 cm). pH 1N KCl, hydrolytic acidity, cation-exchange capacity, total proper area, total organic carbon and dissociation constants were determined in soils.

The study showed that the soil under shelterbelts revealed acidic properties. It was observed that soils of 100-year-old shelterbelt characterizing lowest values pH = 4.2 revealed highest values of hydrolytic acidity equaled to 7.8 cmol(+)·kg^{-1}.

The physicochemical properties of investigated soils shoved specific surface areas (22.8 m^2·g^{-1}), cationic sorptive capacity (12.9 cmol(+)·kg^{-1}). TOC (1.6%) 100-year-old shelterbelt was higher than in 14-year-old shelterbelt.

The dissociation constants were determined by potentiometric titration. This investigation revealed that the pK value was the highest in the humus of 100-year-old shelterbelt (pKa = 3.1). However, soils of 14-year-old shelterbelt characterized by the lovest pK equaled to 2.8.

The surface layer soils shelterbelts in agricultural landscape with good humus development are the most acidic of the soils studied. Most values of acidity, full specific surface areas and sorption capacity are specific to the surface layer of 100-year-old shelterbelt with the highest total organic carbon content.

This work was supported by a grant No. 2295/B/P01/2008/35 founded by Polish Ministry of Education.