



The denitrification properties of soils under three different shelterbelts and in adjoining cultivated fields

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The investigations were carried out in Agroecological Landscape Park in Turew (40 km South-West of Poznań). Intensively agricultural is observed in this region. Characteristic features of this landscape are shelterbelts created in the XIX century by general Dezydery Chlapowski. All shelterbelts and adjoining cultivated fields were introduced on Hapludalfs soils. Three shelterbelts and adjoining cultivated fields were selected for this experiment. Two of them were created approximately 200 years ago. The first shelterbelt consists mainly of *Robinia pseudoacacia* and small admixture *Quercus robur* and *Quercus petraea*. The second one consists of *Crataegus monogyna*. The third one – a young shelterbelt was created in 1993 and consists of several species of plants such as: *Quercus petraea* and *Quercus robur*, *Larix deciduas*, *Pinus sylvestris*, *Sorbus aucuparia*, *Sorbus intermedia*, *Tilia cordata* and some other tree species.

On soils were determined: activity of nitrate reductase, activity of peroxidase, activity of urease and activity of xantine oxidase, total iron, Fe^{+3} , Fe^{+2} , total nitrogen, $N-NH_4^+$, $N-NO_3^-$, total organic carbon (TOC), dissolved organic carbon (DOC), current N_2O , N_2 and CH_4 flux rates, and pH (in 1M KCl).

The contents of total organic carbon, dissolved organic carbon, total nitrogen, $N-NO_3^-$ and $N-NH_4^+$ were higher in the soil under old shelterbelts (*Robinia pseudoacacia* and *Crataegus monogyna*) than under young one. It points out the highest accumulation of organic matter in soils under two old shelterbelts. The same also applied to the current N_2O and N_2 fluxes. Unlike this CH_4 exchange was just low everywhere. Nitrate reductase, urease, xantine oxidase and peroxidase activities participates in the cycle of nitrogen and are sensitive on redox potential in soil. The highest activity of nitrate reductase and xantine oxidase activity were observed in young shelterbelt. Activity of urease and activity of peroxidase were higher under two old shelterbelts *Robinia pseudoacacia* and *Crataegus monogyna* than in young one and in adjoining cultivated fields. The conversion of Fe^{+2} into Fe^{+3} plays an important role in redox processes in soil. Our results have shown that total iron concentrations were higher in soils under three shelterbelts than in adjoining cultivated fields. It was found that pH ranged from 3.29 to 5.98 in soils under shelterbelts and in soils cultivated fields from 4.17 to 6.22. It is one of the factors controlling the rate of denitrification in soil.

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