



Effect of the age of shelterbelts and the composition of plants on the denitrification properties of soil

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The shelterbelts (mid field rows of trees afforestation) fulfill significant functions in agricultural landscape mainly by decreasing wind and soils erosion. The shelterbelts limit also the spread of chemical compounds in agricultural landscape as soon as create refuge sites for wild life. Due to very good developed root system of trees in shelterbelts than cultivated plants, they transpire more 34% water than cultivated fields and intensively take up nutrients and finally improve quality of ground and surface water. The aim of this study was to investigate the process of denitrification in soils under three shelterbelts of different ages and plant composition as well as adjoining cultivated fields. The investigations were carried out in Dezydery Chlapowski Agroecological Landscape Park in Turew (40 km South-West of Poznań, West Polish Lowland). Intensively agriculture is observed in this region. Cultivated fields are represented by 70%, 12% meadows and 14% shelterbelts. Characteristic features of this landscape are shelterbelts created in the XIX century by the general Dezydery Chlapowski. Three shelterbelts and adjoining cultivated fields were selected for this experiment. Two of them were created approximately 200 years ago. First shelterbelt is consisting mainly by *Robinia pseudacacia* and small admixture of *Quercus petraea* and *Quercus robur*. Second one consists of the *Crataegus monogyna*. Third - new shelterbelt was created in 1993 and consists of several species of plants such as: *Quercus petraea* and *Quercus robur*, *Larix decidua*, *Pinus sylvestris*, *Sorbus aucuparia*, *Sorbus intermedia* and *Tilia cordata*. All shelterbelts and adjoining cultivated fields were introduced on Hapludalfs soils. The investigations were carried out during entire vegetation seasonal. Activity of urease, pH (in 1M KCl), dissolved organic carbon (DOC), total organic carbon (TOC), total nitrogen and N-NO₃⁻ were determined in each soils. In general, it was shown the impact of the age of shelterbelts on the concentrations of total and

dissolved organic carbon and total nitrogen, N-NO_3^- , activity of nitrate reductase. The influence of vegetation, temperature on the abundance of total nitrogen, total organic carbon and activity of nitrate reductase was distinct. The contents of total nitrogen and total organic carbon were two times higher in soil under old shelterbelts (*Robinia pseudacacia* and *Crataegus monogyna*) than under young one. Vegetation affects the activity nitrate reductase in the area studied. Activity of nitrate reductase was lower in summer than in autumn and in spring. It might due to higher content of organic nitrogen compounds and favorable conditions for the process of denitrification in autumn and spring than during summertime. Despite differences between results in soil of adjoining cultivated field to *Robinia pseudacacia* shelterbelt the concentrations of dissolved organic carbon and activity of nitrate reductase in soils under shelterbelts and adjoining cultivated fields correlated well.