



The denitrification properties of soils under shelterbelts

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The shelterbelts perform different favourable functions to the environment. For agricultural landscape the most important is the prevention of wind and water erosion, increase of water retention, preservation of biological diversity. Dezydery Chłapowski introduced and propagated mid-field afforestation system in the Wielkopolska region of Poland in XIX century.

Our investigations were focused on the soils under three different afforestations and adjoining cultivated fields. Two shelterbelts were created 200 years ago. One of these includes *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*, *Quercus robur*, *Larix decidua*, *Pinus sylvestris*, *Sorbus aucuparia*, *Sorbus intermedia* and *Tilia cordata*. These three shelterbelts and cultivated fields are located on grey-brown podzolic soil. The activity of nitrate reductase, pH (in 1M KCl), dissolved organic carbon (DOC), total organic carbon (TOC), total nitrogen and N-NH_4^+ as well as N-NO_3^- were determined in each soil.

The amounts of total organic carbon, dissolved organic carbon and total nitrogen were twice higher in the soil under old shelterbelts (*Robinia pseudacacia* and *Crataegus monogyna*) than under young one. It points on the highest accumulation of organic matter in soil under two old shelterbelts. Similar low concentrations of total organic carbon, dissolved organic carbon and total nitrogen were noticed in soils under young shelterbelt and adjoining cultivated fields to all shelterbelts. In soils under two old shelterbelts were also observed the highest activity of nitrate reductase. These observations suggest that the highest content of organic nitrogen compounds and moisturizing may favour denitrification conditions. These investigations have shown the impact

of old shelterbelts on the accumulation of organic matter, different forms of carbon and activity of enzyme in soils.