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The transformation of nitrogen in soil under Robinia Pseudacacia shelterbelt and in adjoining cultivated field

L. Szajdak and W. Gaca

Research Center for Agricultural and Forest Environment, Polish Academy of Science, ul. Bukowska 19, 60-809 Poznań, Poland (szajlech@man.poznan.pl / fax: +48 61 8473668 / phone: +48 61 8475601)

The shelterbelts perform more than twenty different functions favorable to the environment, human economy, health and culture. The most important for agricultural landscape is increase of water retention, purification of ground waters and prevent of pollution spread in the landscape, restriction of wind and water erosion effects, isolation of polluting elements in the landscape, preservation of biological diversity in agricultural areas and mitigation of effects of unfavorable climatic phenomena.

Denitrification is defined as the reduction of nitrate or nitrite coupled to electron transport phosphorylation resulting in gaseous N either as molecular N_2 or as an oxide of N. High content of moisture, low oxygen, neutral and basic pH favour the denitrification. Nitrate reductase is an important enzyme involved in the process of denitrification. The reduction of nitrate to nitrite is catalyzed by nitrate reductase. Nitrite reductase is catalyzed reduction nitrite to nitrous oxide. The conversion of N_2O to N_2 is catalyzed by nitrous oxide reductase. This process leads to the lost of nitrogen in soil mainly in the form of N_2 and N_2O. Nitrous oxide is a greenhouse gas which cause significant depletion of the Earth's stratospheric ozone layer.

The investigations were carried out in Dezydery Chlapowski Agroecological Landscape Park in Turew (40 km South-West of Poznań, West Polish Lowland). Our investigations were focused on the soils under *Robinia pseudacacia* shelterbelt and in adjoining cultivated field. The afforestation was created 200 years ago and it is consist of mainly *Robinia pseudacacia* with admixture of *Quercus petraea* and *Quercus robur*. This shelterbelt and adjoining cultivated field are located on grey-brown podzolic soil.

The aim of this study is to present information on the changes of nitrate reductase activity in soil with admixture urea (organic form of nitrogen) in two different concentrations 0,25% N and 0,5% N. Our results have shown that this process runs according to the equation rate of first–order kinetic reaction model. Activity of nitrate reductase increases with an addition of urea under *Robinia pseudacacia* shelterbelt and in adjoining cultivated fields. However the activity of nitrate reductase decreases during a long term of experiment. First-order rate constant was calculated for the changes of activity of nitrate reductase. Admixture of urea influenced on reaction rate constant. It was observed similar contents at addition 0,25% N and 0,5% N. In adjoining cultivated field to *Robinia pseudacacia* shelterbelt first order rate constant was higher at addition 0,25% N than 0,5% N.

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