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Influence of age and composition of shelterbelts plants on enzyme activity and auxine - phytophormone IAA concentrations in soils

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The investigations were carried out in Dezydery Chlapowski Agroecological Landscape Park in Turew (40 km South-West of Poznań, West Polish Lowlands, 16˚45 E and 52˚01 N). The soil samples were taken from two shelterbelts differing the age and the composition of trees. First 200-years-old shelterbelt is consisting mainly by *Robinia pseudacacia* and small admixture of *Quercus robur and Larix deciduas.* It has 2 kilometers of length and 36 meters of width. The second one new shelterbelt (many species) was created in 1993 and consists of several species of plants such as: *Quercus pertraea* and *Quercus robur, Larix decidua, Pinus silvestris, Sorbus aucuparia, Sorbus intermedia* and *Tilia cordata*. Its length is 340 meters and its width is 17.5 meters. All shelterbelts and adjoining cultivated fields were introduced on Hapludalfs soils (according to FAO classification).

In soil under two shelterbelts and adjoining cultivated fields the activity of the following enzymes nitrate reductase, urease, xanthine oxidase, phenol oxidase, peroxidase activity were measured. In addition, the concentrations of iron ions, indole-3-acetic acids, total organic carbon, dissolved organic carbon, total nitrogen, ammonium and nitrates were determined.

In soils under shelterbelts compared to adjoining cultivated fields higher content of organic matter was observed, because the accumulation of soil organic matter under shelterbelts is suggested to be the main mechanism of long-term withdrawal of various chemical elements from cycling in the agroecosystems. However, many chemical, biochemical, physical and biological processes control conversions of organic compounds in soils and finally these processes depend on the organic matter content and particularly on humic substances. Due to a very good developed root system of trees in shelterbelts than cultivated plants, they transpire more than 34% water than cultivated fields and intensively take up nutrients and finally improve quality of ground and surface water.

The acidity of the soil under the 200-years-old shelterbelt was the highest and during the entire vegetation season pH ranged from 3.19 to 3.51, while for the soil of adjoining cultivated field pH values were much higher (5.03-5.65). However, there are not much differences between pH of the soil under young shelterbelt (created in 1993) and the soil of adjoining cultivated field (3.73-5.25 and 3.72-4.15, respectively).

The activities of enzymes and all chemical compounds were the highest in soil under 200-years-old shelterbelt than in soil under young shelterbelt and two adjoining cultivated fields to both shelterbelts.