

Summary

The phenomenon of resignation from farming on agricultural land became quite common after the social and political changes that took place in Poland in the early 1990s. It particularly concerned less fertile, fragmented and unregulated land ownership status. In the absence of economically attractive afforestation programs, this land was often left to natural processes of secondary succession. In the Polish lowland conditions, the woody birch (*Betula pendula* Roth.) was the tree species that often first entered the former agricultural lands. The spontaneous regeneration of birch on such lands was usually characterized by good growth and stability. However, both the production possibilities of such sites and the environmental effects of the initial phase of succession on post-agricultural land were unknown. The analysis of young natural regenerations was carried out on unused agricultural land in Mazovia. The scope of research presented in this autoreference mainly covered the issue of the balance of elements in the soil-plant system in the juvenile growth phase of a birch stand formed on abandoned post-agricultural land as a result of secondary succession. Several studies have shown how the contents of selected elements (Na, K, Ca, Mg, Fe, Mn, Zn, Cu, Pb, Cd, Ni and Cr) change over time in the soil at different levels of its depth (publication no. 4), how the properties of the surface soil levels change, especially the quantity and quality of soil organic matter (publication no. 3). The influence of birch age (in the age groups: 1-4 years, 5-8 years, 9-12 years and 13-17 years) on quantitative and qualitative changes in biomass was also examined, broken down into individual parts of plants (roots, trunks, branches, bark) and assimilation apparatus) and litterfall (publication no.1). The possibility of using the ITGL (Forest Soil Trophic Index) method to assess the production potential of post-agricultural soils in the initial growth phase of birch stands was also determined (publication no. 2). As a result of the conducted analyzes, it was found that changes in the soils under the influence of the early phase of birch succession improve its properties mainly by increasing the organic carbon stock (publication no. 3), accelerating the decomposition rate expressed by reducing the C/N ratio (publication no. 2), enriching especially of the surface layer of soil in macro – and microelements and an increase in the biological activity of the soil (publication no. 4). Increasing the accumulation of the analyzed elements in birch trees is accompanied by an increase of biomass with time. At the same time, the location of the analyzed elements in the components of birch trees may lead to their role (publication no. 1). The hypothesis was confirmed that leaving agricultural land to spontaneous birch succession for about 1.5 decades did not result in a significant (statistically significant) transformation of the soil, and the amount

of accumulated elements in it was not significantly depleted by birch. Natural regeneration of birch leads to modification of soil properties in terms of the content and quality of soil organic matter, which translates into an increase in the activity of soil microorganisms expressed by enzymatic activity. From the natural point of view, leaving the agricultural land unused to spontaneous succession is a good way to postpone the final decision on its further use and does not preclude further forest management or return to agricultural use.

Keywords: silver birch, post-agricultural land, secondary succession, spontaneous afforestation