

Abstract

Post-mining sites are characterized by unfavorable conditions limiting the rapid development of natural vegetation, which is particularly low nitrogen in the soil. Plants with symbiotic nitrogen fixation can be used for reclamation these degraded areas because they increase the nitrogen content in soil and accelerate the primary succession on the dump.

The aim of this study was to evaluate the growth of three species of plants of the family Fabaceae, namely red clover (*Trifolium pratense*), bird's foot trefoil (*Lotus corniculatus*) and bird wetch (*Vicia cracca*), in differently old soils from dumps that were reclaimed and compare them to the growth in soils from areas that developed by spontaneous succession. Furthermore, to compare the changes in the growth of these species of plants in a situation where they grew separately in the soil compared to the growth in competition with grass (*Poa compressa*). Another aim was to evaluate the influence of the growth of these plants on soil properties during primary succession on the basis of measurement of various parameters in soil.

The mentioned species of plants were sown into the sifted soils taken from the Velká podkrušnohorská výsypka after brown coal mining near Sokolov. The growth took place in a greenhouse for 5 months. Subsequently, above-ground and underground plant biomass, dry soil weight, soil respiration, soil pH, available phosphorus and iron, total carbon, total nitrogen and C:N ratio in soil were determined.

The results showed a different success of the plant growth in the soils, the best was red clover, while bird wetch grew very limited. The growth of all species studied increased with succession age and the plants grew faster in soils from reclaimed sites than in soil from unreclaimed sites, but with increasing age the differences decreased. The growth of the grass in competition with leguminous plants has also increased with increasing site age. The observed species of leguminous plants with competition of grass grew less than without competition, with the exception of the youngest site (15 years old) where the growth was comparable. The low growth of bird wetch was overgrown by grass.

The growth of the observed species of leguminous plants increased the amount of nitrogen in the soil. Further soil properties affected most red clover, which accelerated the accumulation of organic carbon, improved soil moisture and affected the amount of available phosphorus, iron and soil pH.

Keywords: symbiotic nitrogen fixation, leguminous plants, primary succession, post-mining sites, reclamation