

Summary

The study evaluated the role of selected tree species that have been used in practice for many years: Scots pine (*Pinus sylvestris* L.), European larch (*Larix decidua* Mill.), common oak (*Quercus robur* L.), black locust (*Robinia pseudoacacia* L.), common alder (*Alnus glutinosa* (L.) Gaertn), and those used experimentally Norway spruce (*Picea abies* L.) and European beech (*Fagus sylvatica* L.) for afforestation of coal mining waste rock dumps of the JSW S.A Knurów-Szczygłowice coal mine. The slopes were reclaimed with mineral soil obtained from different projects and earthwork in Upper Silesia. The suitability of selected tree species was assessed taking into account the growth characteristics and mineral supply, growth success, and soil forming effect of selected tree species, and the assessment was done in two experiments: Experiment I – stands in age class 1, and Experiment II – crops established in 2016. Good growth parameters were found in black locust, European larch and the Scots pine, which confirms their suitability for reclamation of this type of sites after coal mining. The analyses also confirmed the soil-forming role of the studied older stands (Experiment I), which was manifested mainly through the acidification of the top organic mineral initial horizons (Oi horizon, 0-5 cm) compared to deeper layers (Ai initial horizon, 5-20 cm). The results of the assessment of the survival, success and growth parameters of the crops (Experiment II) indicate the high suitability of the Scots pine and common oak. The results of the assessment of suitability of the beech, on the other hand, give a new perspective on the possibility of using this species in the reclamation of such sites, with the use of cover of alkaline mineral soil. The floristic studies of herbaceous plants in the ground cover, carried out in older stands, showed the highest cover in alder and black locust stands in this layer. The analysis of tree root systems in both Experiment I and Experiment II showed their strong deformation. In older stands (Experiment I), a very flattened root system and disorders in its development were found, and this was related to the shallow layer of mineral soil used to cover the dump. The root systems of trees introduced into the dump in Experiment II were characterized by strong deformation and growth disorders involving the growth of roots inside the plug. The analysis of root system development shows that there is a significant problem with the development of tree root systems in post-mining areas.