



Evaluation of forest trees growth after sewage sludge application

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Sewage sludge is extensively used in forest to improve soil properties. It is expected that sewage sludge rich in phosphorus, nitrogen and organic material enhance the germination of tree seedlings in poor soils. In Lithuania, the deforested soils are highly acid, and have a lack of nutrients, especially in exploited peat areas. Sewage sludge from industry contains beneficial components for the soils (such as organic matter, phosphorus, nitrogen, calcium, magnesium, etc.). However, it is also rich in heavy metals, especially Cd, Pb, Cu and Zn. High heavy metals concentrations in soil can be phytotoxic and cause reduced plant growth or plant death. The main objectives of this research was to determine the influence of industrial sewage sludge in the forestry and to highlight the idea that industrial sewage sludge containing metals does not favour development of birch and pine trees. The study was performed in Taruskos experimental plot in Panevezys region (Lithuania), amended with industrial sewage sludge ten years ago was afforested with birch and pine seedlings. In order to observe the effects of the amendment in accumulation the mentioned metals and tree growth we collected data from trees in amended plot and control plot. The results showed that soil parameters were improved in the amended plot, in comparing with control site (higher pH, organic matter and cation exchange capacity). However, the growth of investigated trees was slower (e.g. birch roots, shoot, stem and leaves biomass was 40, 7.4, 18.6, 22% smaller than in control site. In pine case: 30, 1.2, 17, 36%, respectively; the stem height of birch was 16% and pine – 12% smaller than in control site). This reduced growth can be related with heavy metals concentration load on soil and accumulation in trees. Cu and Cd concentrations were higher in soil amended with sewage sludge comparing with control site (60 and 36%, respectively). Also, in contaminated trees Cu and Cd concentrations were higher (Cu – 37% in birch and 27% in pine shoots; 6% in birch and 73% in pine roots; Cd was 3% in birch and 1.4% in pine shoots; 53% in birch and 24% in pine roots). Our results showed that the sewage sludge applied from industrial sources was not effective to improve tree growth, despite the fact, that it revealed positive effects on forest soil properties.