Effect of unconventional fertilization on heavy metal content in the biomass of giant *Miscanthus giganteus*

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**ABSTRACT**

The article presents the results of the studies on the effects of fertilization with (1) sewage sludge, (2) compost produced from the mixture of sewage sludge and forestry waste and (3) compost from green waste produced with Dano technology on bioaccumulation of heavy metals in *Miscanthus giganteus* biomass. The results were obtained from the pot experiment in semi-natural conditions during the period of April 2007 to November 2010. The testing presents the studies concerning the third year of the experiment (the plant crop of November 2010). The soil used for cultivation of *M. giganteus* was sampled from the area in close vicinity to the steel works. The effects of sewage sludge, compost and mineral fertilizers on the concentration of Cd, Zn, Pb and Ni were compared in the above-ground parts and roots of *M. giganteus*. These treatments resulted in an increase in the concentration of zinc, cadmium, lead and nickel in the soil in comparison to the control. The highest increase in the concentration of metals was observed in soil fertilized with sewage sludge at the lowest dose of 40 t/ha. The results obtained in the third year of the experiment indicate that the *M. giganteus* has a tendency to accumulate zinc and cadmium in the above-ground parts, and lead in the roots. Depending on the treatment, the concentration of the investigated metals in the above-ground parts of *M. giganteus* was in the range of 57.0–62.5 mg/kg for Zn, 0.88–1.18 mg/kg for Cd, 3.70–3.90 mg/kg for Pb and 3.15–3.90 mg/kg for Ni. The lowest concentrations of Zn, Cd, Pb and Ni in the above-ground biomass of the plant was observed for mineral fertilization and the control. The highest concentrations of zinc, cadmium and lead were observed in biomass of plants grown on soils fertilized with sewage sludge at the dose of 20 t/ha, whereas the highest concentrations of nickel were observed for soils fertilized with the compost produced with Dano technology. However, fertilization of soils with sewage sludge and compost had no impact on the concentration of zinc, cadmium, lead and nickel in the biomass of *M. giganteus*. The concentrations of Cd, Zn, Pd and Ni in the roots were affected by the type of fertilization, and in most cases, the concentration was the highest when sewage sludge at dose of 20 and 40 t/ha was applied. Furthermore, some significant differences regarding bioaccumulation indicators for the above-ground parts and roots of the plant and selected metals were observed.

*Keywords:* *Miscanthus giganteus*; Soil; Heavy metals; Compost; Sewage sludge

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