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Assessment of compost application to coal ash disposal sites to promote the rapid vegetation establishment

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In the city of Tuzla, located in Bosnia and Herzegovina, a coal fired thermo electric power plant is operated by the company JP ELEKTROPRIVERDA BIH TERMOELEKTRANA “TUZLA”. High amounts of ash are produced by the power plant, which are currently disposed into settlement ponds bordered by dams in natural valleys. A total of four ash disposal sites covering an area of approx. 170 ha have been established during the last decades.

Due to the fact that residual ash from coal combustion was found to contain a variety of trace elements (Ni, Cr, As, B), it must be assumed that ash disposal of that magnitude constitutes an environmental problem which is investigated within the EU-FP6 / STREP project “Reintegration of Coal Ash Disposal Sites and Mitigation of Pollution in the West Balkan Area” RECOAL. The main hazards relate to soil and groundwater contamination due to leaching toxins, dust dispersion, and toxins entering the food chain as these disposal sites are used for agricultural purposes.

In order to rapidly establish a vegetation cover on barren ash dumps that particularly would prevent dust erosion we assessed the applicability of compost, produced from locally available municipal and industrial organic residues as an amendment to ash to improve substrate fertility. The envisaged remediation technology was considered to be a low cost, easy applicable and rapid method capable of substantially enhancing living conditions of residents in the vicinity of the abandoned disposal sites.

Various compost application rates were evaluated in the field on experimental site Divkovici I in Tuzla and additionally in the greenhouse environment at Brandenburg Technical University Cottbus. Field and laboratory tests revealed that plant growth and cover rate can substantially be improved by mixing compost into the upper ash layer to a maximum depth of approx. 20 cm. Besides direct growth observations in the field analysis of soil parameters gave evidence that the fertility of ashy substrates amended with compost produced from locally available sewage sludge and saw dust can be improved. The metal content of grass grown in the various treatments was considered to be elevated compared to normal contents. However, metal uptake in compost treatments was lower than in untreated plots. A preliminary cost assessment, comparing the remediation technology tested on site Divkovici with a standard soil covering technique revealed financial benefits for the compost method due to significant lower application rates.