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Successive alkalinity producing system for the treatment of
acid sulphate soil runoff: preliminary results of a field trial

Keywords aluminium, acid sulphate soils, iron, manganese, successive
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Abstract

A successive alkalinity producing system (SAPS) has been investigated as a potential passive treatment option for acid, metal containing runoff from acid sulphate soil. A pilot-scale system was installed at an agricultural land site in Rintala embankment area in mid-western Finland. The experimental layout consists of three parallel treatment units: two different SAPS cells and one limestone-filled cell for comparison of performance. The SAPS cells are composed of a bottom layer of limestone and a top layer of compost supplemented with sand. One of the SAPS cells contains sulphate-rich, waste gypsum mixed with the compost layer in order to enhance the metal reduction by sulphate reducing-bacteria. Over a 3 year period on average between 6–12 l min⁻¹ of water from a nearby drain receiving acid drainage was directed to the system. The quality of the influent water was highly variable: pH 4.1–7.1, aluminium 0.061–29 mg l⁻¹, iron 0.046–22 mg l⁻¹, manganese 1.9–23 mg l⁻¹. Flow through the cells increased the pH and decreased the acidity and concentrations of Al and Fe. Manganese concentrations did not change significantly ($P < 0.05$, paired t-test) in any of the treatment cells. The current results do not demonstrate the advantages of a SAPS system when compared to a limestone bed and the present implementation is not considered to be an effective treatment method for acid drainage water. Therefore, to increase the alkalinity production of SAPS cells, the system will be modified to increase the contact time of water with limestone.

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