

Ecotoxicity of chicken manure derived biochars

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Abstract

© 2018, International Multidisciplinary Scientific Geoconference. All rights reserved. High concentrations of ammonium, toxic organic compounds, pathogenic microflora make chicken manure one of the most toxic agricultural wastes. The use of chicken manure in plant growing is only possible after its treatment, e.g. by means of composting or anaerobic digestion. One of alternative ways of chicken manure treatment is its pyrolysis, as a result of which pyrolysis fuel and biochar are produced. The latter can be used as nontraditional organic fertilizer. However, the properties of biochar produced from chicken manure are not studied enough. In particular, there are no sufficient data about the toxicity of biochar produced from chicken manure at different temperatures and durations of pyrolysis. In the present work the toxicity of biochars produced from chicken manure obtained from a large poultry complex situated in the Republic of Tatarstan (Russia) was evaluated using three methods of biotesting in hydrobionts (*Paramecium caudatum*, *Ceriodaphnia affinis*) and in higher plants (*Hordeum vulgare*). Biochars were produced at 400, 500, 600°C peak temperatures and durations of 1, 2, 3 and 4 h. It was determined that when the temperature of pyrolysis was increased up to 600°C and the duration of it up to 3 and 4 hours, biochar toxic to *P. caudatum*, *C. affinis* and *H. vulgare* was produced. The pyrolysis of chicken manure at the temperature of 400°C and the duration of 2 hours, as well as at the temperature of 500°C and the duration of 3 hours leads to the production of substantially non-toxic biochar. In whole, pyrolysis helped to reduce the toxic properties of chicken manure.

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Keywords

Biochar, Chicken manure, Eco-toxicity, Pyrolysis

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