

添加农作物秸秆炭对红壤吸附Cu(II)的影响

佟雪娇, 李九玉, 姜军, 徐仁扣

中国科学院南京土壤研究所

Effect of Biochars Derived From Crop Straws on Cu(II) Adsorption by Red Soils

TONG Xue-Jiao, LI Jiu-Yu, JIANG Jun, XU Ren-Kou

Institute of Soil Science, Chinese Academy of Sciences

摘要

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摘要 为考察秸秆生物质炭在重金属污染红壤修复中的作用,用一次平衡法研究了由花生秸秆、大豆秸秆、稻草和油菜秸秆制备的4种生物质炭对采自江西和广西的2种红壤吸附Cu(II)的影响及其机制。结果表明,添加由农作物秸秆制备的生物质炭提高了红壤对Cu(II)的吸附量,生物质炭对Cu(II)吸附的促进作用随生物质炭添加量的增加而显著增加,低pH值条件下促进作用更明显。pH4.0和w为2%生物质炭添加水平下,油菜秸秆炭、花生秸秆炭、大豆秸秆炭和稻草炭使江西红壤对Cu(II)的吸附量较对照分别增加97%、79%、51%和54%;花生秸秆炭和大豆秸秆炭使广西红壤对Cu(II)吸附量较对照分别增加61%和44%,当生物质炭添加水平w达4%时,Cu(II)吸附量的增幅达97%和165%。生物质炭表面带负电荷,可以同时增加红壤对Cu(II)的静电吸附量和专性吸附量,但以增加专性吸附为主。因此,添加秸秆生物质炭可以有效降低Cu(II)在酸性红壤中的活动性和生物有效性。

关键词: 红壤 生物质炭 作物秸秆 Cu(II)吸附

Abstract: Effects of 4 kinds of biochars derived from straws of peanut, soybean, canola and rice, separately, on Cu(II) adsorption by the red soil samples from Jiangxi and Guangxi were investigated with batch method, to explore roles of the biochars in remedying heavy metal polluted red soils. Results indicate that incorporation of the biochars in created Cu(II) adsorption by the soils. The effect was enhanced with decreasing pH of the system and with increasing application rate of biochars as well. With pH at 4.0 and biochar added at 2%, Cu(II) adsorption increased by 97%, 79%, 51% and 54%, respectively, by application of biochar of canola, peanut, soybean and rice straws in the red soil from Jiangxi, and by 61% and 44%, respectively, by application of biochar of peanut straw and soybean straw in the red soil from Guangxi. The increment reached to 97% and 165%, respectively, when the addition of the biochars of the biochars was increased to 4%. Biochars normally carry negative charges and have ample amount of oxygen-containing functional groups on their surfaces, which greatly increase electrostatic and specific adsorptions of Cu(II) in the red soils simultaneously, but it is more significant with the latter than with the former. Therefore, incorporation of biochars can effectively reduce mobility and bioavailability of Cu(II) in acid red soils.

Keywords: red soil biochar crop straw Cu(II) adsorption

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Corresponding Authors: 徐仁扣 中国科学院南京土壤研究所 Email: rkxu@issas.ac.cn

About author: 佟雪娇 (1988-), 女, 内蒙古赤峰人, 硕士生, 主要研究方向为生物质炭对土/水体系中重金属的固定/去除。E-mail: xue881128@163.com

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