

改良剂对重金属复合污染土壤中菜用大豆品质及生理特性的影响

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Effects of Amendments on Quality and Physiological Characteristics of Young Soybean Grown in Soil Contaminated by Heavy Metals in Combination

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摘要 通过盆栽试验,研究了在重度Cu、Zn、Pb、Cd复合污染土壤上,分别施用凹凸棒土(25 g·kg⁻¹)、硅藻土(25 g·kg⁻¹)、泥炭(25 g·kg⁻¹)和腐植酸(4 g·kg⁻¹) 4种改良剂对菜用大豆(*Glycine max*) (以下简称大豆)植株生长、籽粒施用品质及叶片生理特性的影响。结果表明:有机物料能有效提高大豆籽粒产量和粗蛋白含量,改善大豆籽粒的施用品质,但黏土矿物对大豆籽粒产量及品质的影响不明显;有机物料、黏土矿物能缓解重金属对植物的毒害,腐植酸、泥炭、凹凸棒土处理大豆叶片苗期SOD活性显著高于对照(P<0.05),而硅藻土处理大豆苗期SOD活性与对照之间差异不显著(P>0.05),但成熟期SOD活性却显著高于对照(P<0.05)。除腐植酸处理外,添加其他改良剂处理苗期、成熟期大豆叶片叶绿素含量与对照之间差异均未达显著水平(P>0.05);腐植酸降低大豆籽粒中重金属含量的效果最好,该处理大豆籽粒中Cu、Zn、Pb、Cd含量分别比对照降低28.8%、21.6%、35.0%和12.5%,硅藻土次之,而添加泥炭、凹凸棒土对大豆籽粒中重金属含量的影响与对照相比为达显著水平(P>0.05)。

关键词: 重金属 复合污染 改良剂 大豆 生理特性 食用品质

Abstract: Effects of soil amendments, including attapulgite (25 g·kg⁻¹), diatomite (25 g·kg⁻¹), peat (25 g·kg⁻¹) and humic acid (4 g·kg⁻¹) on growth, quality and physiological characteristics of young soybean grown in soil contaminated with heavy metals in combination were studied through pot experiment. Results show that compared with the clay minerals (diatomite and attapulgite), the organic materials (humic acid and peat) significantly increased yield and crude proteins content of the grains, and improved their eating quality. All the amendments mitigated the toxicity of heavy metals to plant. Humic acid, peat and attapulgite obviously increased SOD activity in leaves of the plants at the seeding stage (P<0.05), but diatomite did not, till the plants reached the maturing stage. Among the amendments, only humic acid increased significantly chlorophyll content in leaves of the plants at the seedling and maturing stages (P<0.05). And humic acid was also the most effective in lowering contents of heavy metals in grain and decreased the content of Zn, Cu, Cd and Pb by 28.8%, 21.6%, 35.0% and 12.5%, respectively, as compared with CK. Diatomite followed in the effect, however peat and attapulgite did not show any significant effect in this aspect.

Keywords: Heavy metal compound pollution amendment young soybean physiological characteristics food quality

Received 2010-11-30;

Fund:

国家自然科学基金(30700480); 国家重大科学研究计划(2007CB36604); 中国科学院知识创新工程重要方向项目(kzcx2-yw-404)

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引用本文:

王意锟, 方升佐, 王玉军, 郝秀珍, 周东美, 张焕朝. 改良剂对重金属复合污染土壤中菜用大豆品质及生理特性的影响[J] 生态与农村环境学报, 2011, V27(3): 87-92

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