

土壤B[a]P叠加污染对蚯蚓体腔细胞SOD、POD和MDA的毒性效应

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Toxic Effects of Repeated Superimposed B[a]P Pollution of Soil on SOD, POD and MDA in Coelomocytes of *Eisenia foetida*

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摘要

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摘要 采用累积试验方法, 研究土壤苯并[a]芘(B[a]P)多次叠加污染对赤子爱胜蚓 (*Eisenia foetida*) 体腔细胞超氧化物歧化酶(SOD)、过氧化物酶(POD)和丙二醛(MDA)的毒性效应。结果表明, 随着土壤中B[a]P暴露时间的延长, 蚯蚓体腔细胞的SOD、POD活性和MDA含量呈初期(1~14 d)下降速率较快, 尔后(14~56 d)下降速率减小的变化趋势。在叠加污染条件下, 0~20 cm深度土壤蚯蚓体腔细胞SOD活性和MDA含量在14 d时分别比一次污染低20.97%和15.96%, POD活性比一次污染高20.44%; 而在>20~40 cm深度土壤中蚯蚓体腔细胞SOD、POD活性和MDA含量在14 d时分别比一次污染低52.89%、18.00%和70.60%。表明B[a]P叠加污染土壤中蚯蚓体腔细胞的毒性效应低于一次污染。

关键词: 苯并[a]芘(B[a]P) 叠加污染 蚯蚓 体腔细胞 SOD POD MDA

Abstract: As a persistent organic pollutant (POP), benzo(a)pyrene (B[a]P) is gradually accumulating in the soil, posing a serious threat to the soil environment quality. The routine approach to environmental risk assessment of B[a]P is only based on one-time pollution, i.e. mixing the soil with B[a]P only once, which deviates from the step-by-step procedure of B[a]P entering the soil. In this paper, a toxic bioassay was conducted to investigate toxic effects of B[a]P on superoxide dismutase (SOD) and peroxidase (POD) activities and malondialdehyde (MDA) levels in coelomocytes of earthworm (*Eisenia foetida*), using the multiple-time superimposed and one-time pollution methods. Results show that with the exposure to B[a]P going on, SOD and POD activities and MDA content in coelomocytes of earthworm dropped rapidly in the first 14 days (1-14 d), and then declined slowly in the 42 days to follow (14-56 d) under both the multiple-time superimposed and one-time pollution methods. In the first 14 days, the SOD activity and MDA content in earthworms found in the 0-20 cm soil layer under superimposed pollution was 20.97% and 15.96% lower, respectively, while POD activity was 20.44% higher than that under one-time pollution. However, the SOD and POD activities, as well as the MDA content in earthworms found in the >20-40 cm soil layer under superimposed pollution was 52.89%, 18.00% and 70.60% lower than that under one-time pollution, respectively. All the above findings suggest that toxicity of multiple-time superimposed B[a]P pollution to earthworms was lower than that of one-time pollution. The study provides crucial data for evaluating ecological toxicity of cumulative B[a]P pollution in the soil.

Keywords: B[a]P superimposed pollution *Eisenia foetida* coelomocyte SOD POD MDA

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