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Internet Journal

Gate to Environmental and Health Science (Gate to EHS)

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Methods (or Main Features)
Results and Discussion
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Example for title and author line:

Development of Damage Function of Acidification for Terrestrial Ecosystems

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Abstract: Please separate the abstract into the following sections which can be adapted to suit the particular type of article (e.g. methodological papers, case studies, discussion papers, commentaries):

Goal, Scope and Background

Methods (or Main Features)
Results and Discussion
Conclusion

Recommendation and Perspective (Outlook)

(see example below)

Example: Abstract with Keywords (up to ten, in alphabetical order and separated by semicolons)

Background, Aims and Scope. Endpoints in earthworm ecotoxicology scheduled in guidelines are mortality and reproduction rates. However, not only the direct influence of pollutants on population parameters but also changes in behaviour such as substrate avoidance can have an important impact on soil ecosystems. In practice two different avoidance response tests are applied in earthworm ecotoxicology: (i) a six-chamber test system and (ii) a two-chamber test system. Both avoidance response-test systems were compared to establish their respective advantages and disadvantages in order to advance the standardisation of behavioural tests. The earthworm avoidance-response tests were applied in addition to the standard acute and chronic earthworm toxicity tests (ISO 11268) in order to compare the sensitivity of the test endpoints.

Methods. Test substrates were contaminated with crude oil and 2,4,6-Trinitrotoluene (TNT), respectively. The test species was *Eisenia fetida*. The earthworms were exposed to the contaminated substrates and their mortality (14 d), reproduction rates (number of cocoons after 28 d, juvenile hatching after 56 days), and substrate preference (48 h) determined.

Results and Discussion. Whereas 1000 mg/kg TPH (Total Petroleum Hydrocarbons) did not show any lethal effects, 100% mortality occurred in soil with comparable TNT concentration. The acute tests consistently produced the highest effect concentrations whereas reproduction and substrate avoidance were the more sensitive test parameters. Both behavioural test systems, when compared, showed similar substrate avoidance after an incubation time of 48 h. The six-chamber test system provides the potential to test six different substrates/concentrations at one time. It was observed, however, that earthworms did not migrate among all test chambers within a test unit in order to select the most appropriate substrate. Orientation was observed only between directly neighbouring test compartments, which complicates the interpretation of the test results.

Conclusion. Substrate avoidance and reproduction variables were clearly more sensitive test endpoints than mortality. Therefore avoidance-response tests proved to be useful test methods in detecting effects of sublethal concentrations of pollutants on earthworms. The test duration of the avoidance tests is much shorter compared to the standard acute and chronic earthworm toxicity tests, which makes them a quick screening tool for identifying potential soil toxicity. Both avoidance-response test systems showed comparable results regarding the test sensitivity. Nonetheless, the incomplete substrate use in the six-chamber avoidance test due to the reduced migration possibilities (orientation only to neighbouring chambers) might reduce the distinctness of test results as it allows only reliable information on the most avoided and therefore most toxic substrate but not on a clear dose-response pattern. Thus, to gain valid results, the number of replicates and the arrangement of the different substrates must be adopted. The two-chamber test system is less time-consuming due to easy handling and test results can be quantified more easily.

Recommendation and Outlook. In consequence of the better validity of test results, lower expenses for test containers and less time for handling, the use of the two-chamber system is preferred over the six-chamber test system to assess the toxicity of polluted soil. Because of the ecosystem consequences of behavioural effects and the fact that avoidance response tests can reveal the toxic potential of pollutants in low concentrations, such tests should be included into ecotoxicological test protocols.

Keywords: Avoidance response test; crude oil; earthworm ecotoxicology; *Eisenia fetida*; six-chamber avoidance test; 2,4,6-trinitrotoluene (TNT); two-chamber avoidance test

Keywords: Please cite up to a maximum of 10 keywords, listed alphabetically and separated by semicolons.

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Fujita S, Takahashi A, Hayami H, Sakurai T (2000): Wet Deposition of Nitrate and Ammonium over the Japanese Archipelago. Environ Sci 13, 491–501
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[1] Fujita S, Takahashi A, Hayami H, Sakurai T (2000): Wet Deposition of Nitrate and Ammonium over the Japanese Archipelago. Environ Sci 13, 491–501

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