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Earthworm biomarkers of pesticide contamination: Current status and perspectives

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Abstract:
Earthworms are standard test organisms in soil toxicity testing. They have been broadly used to assess environmental impact from heavy metal pollution; however, the knowledge on toxic effects from pesticides upon these organisms is still very limited. One of the ecotoxicological approaches to assess pollutant bioavailability and sublethal effects is the use of molecular and biochemical biomarkers. This review focuses on five issues that need further investigation: 1) field validation of earthworm biomarkers of pesticide exposure (*e.g.*, cholinesterases) as well as testing and development in earthworms of those biomarkers of pesticide exposure currently used in other organisms (*e.g.*, carboxylesterases), 2) the impact of environmental and biological interfering factors upon biomarker responses, 3) the development of biomarker-based approaches to assess long-term pesticide exposure, and 4) the need to develop biomarkers of behavioural and reproductive disruption with direct implications at individual and population levels.

Keywords:
earthworm, pesticide, biomarker, behavioural toxicology, long-term exposure

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