

## **Assessing the Impact of Triazine Herbicides on Organophosphate Insecticide Toxicity to the Earthworm *Eisenia fetida***

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Received: 17 September 2002 / Accepted: 23 February 2003

**Abstract.** A standard Organization for Economic Cooperation and Development (OECD) filter paper test was used to assess the acute toxicity of chlorpyrifos, atrazine, cyanazine, and simazine to the earthworm *Eisenia fetida*. Acute toxicity of chlorpyrifos was also determined in combination with the three-triazine herbicides. Surprisingly, atrazine and cyanazine caused mortality at concentrations lower than chlorpyrifos. Atrazine and cyanazine also increased the toxicity of chlorpyrifos 7.9- and 2.2-fold, respectively. However, simazine caused no toxicity to the worms and did not affect chlorpyrifos toxicity in binary mixture experiments. Possible mechanisms for the greater-than-additive toxicity for the binary combinations of atrazine and cyanazine with chlorpyrifos were investigated, including changes in uptake and biotransformation rates of chlorpyrifos in the presence of atrazine. Uptake of chlorpyrifos into the worms decreased slightly when atrazine was present in the system, therefore eliminating increased uptake as a possible explanation for the increased toxicity. Body residue analysis of worms indicated increased metabolite formation, suggesting the greater-than-additive response may be due to increased biotransformation to more toxic oxon metabolites.