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A Simple and Rapid Evaluation System for Toxicity of Endosulfan Using *Lumbricus rubellus* and Microplate

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Endosulfan (ES) is a chlorinated cyclodiene insecticide, which has been widely used for the control of numerous insects in a wide variety of food and non-food crops. However, the strong endocrine disrupting potential of ES and the ROS mediated cytotoxicity by treatment of ES bring about serious environmental problems. The evaluation of ES toxicity is difficult, because the metabolite of ES, such as ES sulfate, is more toxic than a parent compound, the metabolites produced are dependent on the environmental conditions, and ES has multiple targets. In this study, we established a simple and rapid evaluation system for ES and its toxic metabolites using *Lumbricus rubellus* and 12-well microplate. The toxicity was evaluated after direct contact of ES in minimal medium and quantified by measuring of concentration of secreted fluids from *L. rubellus* at 420 nm. The linear calibration was obtained at concentration between 2 ppm and 10 ppm, and 18~24 hr treatment. This method is useful to evaluate the toxicity of different metabolites and accumulated toxicity of mixtures. Also, this was successfully extended to evaluation of detoxification activity of ES degrading bacteria.