

210 - Toxicity of *Bacillus thuringiensis* to aquatic non-target organisms and its influence on toxicity of chloropyrifos

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Since the commercialization of transgenic cotton, which expressed Cry toxins produced by *Bacillus thuringiensis* (Bt) in 1997, its cultivation has increased dramatically. Planting Bt cottons tremendously reduced the use of broad spectrum chemical pesticides, but the widespread cultivation of Bt crops has raised public concerns on their toxicity to non-target organisms. On the other hand, chemical pesticides were also noted to be applied in Bt cotton fields in some occasions. The current study investigated toxicity of Bt toxin to non-target aquatic organisms and its impact on toxicity of an organophosphate pesticide, chloropyrifos. Response surface methodology was used to optimize the extraction of Cry1Ac protein from solid matrices, and the optimum extraction conditions were at 21 °C and 630 rpm for 2 h. The method showed high precision and sensitivity with the method detection limit of 0.8 ng/g dry weight and relative standard deviation of 7.3%. The dissipation of Cry1Ac protein in different matrices was investigated using a first-order kinetic equation, and DT₅₀ values ranged from 0.8 to 3.2, 2.1 to 7.6 and 11.0 to 15.8 d in soil, sediment and water, respectively. Microbial degradation contributed the most to the dissipation of Cry1Ac protein, and high temperature accelerated the processes. While Bt proteins persisted for a longer time in aquatic systems than in soil, toxicity of Bt toxins to aquatic non-target organisms *Chironomus dilutus* and *Hyalella azteca* was limited. Last, joint toxicity of Cry1Ac protein and chloropyrifos was evaluated using mortality, movement, and acetylcholinesterase inhibition as toxic endpoints. Compared to the toxicity estimates using independent action and concentration addition models, an antagonistic interaction was noted when both pesticides were applied simultaneously in both sediment and water-only bioassays, while the organisms which were pre-fed with Bt proteins showed no change in susceptibility to chloropyrifos.

Monday, September 9, 2013 08:00 PM

Sci-Mix (08:00 PM - 10:00 PM)

Location: Indiana Convention Center

Room: Halls F&G

Tuesday, September 10, 2013 01:00 PM

Protection of Agricultural Productivity, Public Health, and the Environment (01:00 PM - 05:00 PM)

Location: Indiana Convention Center

Room: Halls F&G