

Imidacloprid effects on New Zealand mayfly nymphs: acute and chronic exposure and interactions with natural stressors

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Eligible for student prize

Neonicotinoids, the most widely used group of pesticides worldwide, are perceived to be a safer alternative for wildlife and for humans due to their specificity to insect receptors in the central nervous system, and because their physicochemical properties lend them advantages in terms of ease of application and effectiveness against pest insects. However, these properties also mean they are highly toxic to non-target invertebrate species and readily enter surface waters. Effects of neonicotinoids on freshwater invertebrates have been increasingly investigated in recent years, and mayfly larvae are particularly sensitive. In New Zealand, almost nothing is known regarding the impact neonicotinoids may have on freshwater invertebrates. In this talk I will describe a series of laboratory toxicity experiments, including one 96-hour study and two longer 'chronic' studies using *Deleatidium* spp. larvae and imidacloprid, a neonicotinoid. Results of the 96-hour study showed no difference in toxicity between 'pure' imidacloprid and Confidor, one of its commercial formulations. The two chronic studies together aimed to explore the individual and combined effects of constant low-level imidacloprid exposure, food availability and mayfly density on *Deleatidium* larvae. Low imidacloprid concentrations had severe lethal and sublethal effects on individuals. A prior starvation period had delayed effects on mayfly responses, with some evidence that starvation amplified the effect of imidacloprid on sublethal responses. These findings suggest that periods of food shortage may worsen the impact of exposure to imidacloprid in the stream environment. Worldwide, few studies have explored interactive effects between neonicotinoid exposure and biotic variables on freshwater insects.

