

Pesticides: More toxic than previously thought?

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Insecticides may be more toxic to common spiders than previously thought. Copper jumping spiders play an important role in controlling pests in fields. Credit: Crystal Ernst

Insecticides that are sprayed in orchards and fields across North America may be more toxic to spiders than scientists previously believed. A McGill research team reached this conclusion after looking at changes in the behaviour of individual Bronze Jumping Spiders both before and after exposure to Phosmet, a widely used broad spectrum insecticide. It is a finding with far-reaching implications for agricultural production and ecosystem health.

"Bronze [jumping spiders](#) play an important role in orchards and fields, especially at the beginning of the agricultural season, by eating many of the pests like the oblique-banded leafroller, a moth that attacks young plants and fruit," says Raphaël Royauté, a former McGill PhD student whose study on the subject was published in *Functional Ecology* recently. "Farmers spray insecticides on the plants to get rid of these same pests, and it was thought that it had little significant effect on the spiders' behaviours. But we now know that this isn't the case."

The researchers discovered this fact by focusing on the way that exposure to insecticide affected the [behaviour](#) of individual spiders, including things like their ability to leap on prey and their interest in exploring new territory, both of which are crucial to their survival and to their role in keeping down pests.

Spider personalities

"Most individuals have an individual signature in their behaviours, what scientist call "personality types" says Royauté. "Some individuals are willing to take risks when predators are present, explore new territories faster, or capture prey more quickly. But the effects of insecticides on personality types remains poorly described."



When faced with its reflection in the mirror, this "shy" spider backs away.
Credit: Raphael Royaute

The researchers found that, in general, the behaviour of [spiders](#) became more "unpredictable" and individuals behaved less according to their [personality type](#) once they were exposed to insecticide. This could be because some individuals are much more sensitive to the insecticide than others. Interestingly, they also found that male and [female spiders](#) were affected differently. Males who had been exposed to the insecticide were able to continue to capture prey as they had before, but "lost" their personality type when exploring their environment. Individual females, on the other hand, were much more affected in their ability to capture prey.

"By looking at the way that insecticides affect individual spider behaviours, rather than averaging out the effects on the spider population as a whole, as is traditionally done in scientific research, we are able to see some significant effects that we might have otherwise missed," says Chris Buddle, who co-authored the paper. "It means we can measure the

effects of insecticides before any effects on the spider population as a whole are detected, and in this case, it's raising some red flags."



On seeing its reflection in a mirror, this "aggressive" jumping spider immediately attacks. Credit: Raphael Royauté

The researchers hope that this study will lead to the reevaluation of procedures used to estimate the toxicity of insecticidal compounds by encouraging other researchers to pay more attention to effects occurring at the individual level.

More information: Under the influence: sublethal exposure to an insecticide affects personality expression in a jumping spider. Royauté R, et al (2015). *Functional Ecology*. 29: 962-970. [DOI:](#)

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