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The effect of insecticides on jumping spider personalities

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*This post was written by C. Buddle and **R. Royaute** (a PhD student in the Arthropod Ecology lab).*

We are pleased to announce a recent publication from our lab, titled *Interpopulation variations in behavioral syndromes of a jumping spider from insecticide-treated and insecticide-free Orchards*. As is traditional in the lab, here's a **plain language summary** of the work:

Agriculture has strongly intensified in the last 60 years, causing major concerns the sustainability of biodiversity. Agricultural practices can reduce habitats available for wildlife and also release toxins in the environment through the use of pesticides. Not all organisms living in agricultural fields are harmful, and many predators, including spiders, can help to reduce pest density. We have a relatively good knowledge that the diversity of spider species in agriculture, especially under our temperate latitudes, can help reduce pest damage. However, many of the factors that influence spider predation on pests depend on the outcome of behavioural interactions and we don't know much about that topic. Spiders are often cannibalistic and aggressive with one another and these types of behaviours may limit their efficiency for pest control. We also need to understand if these aggressive tendencies vary depending on the type of agricultural field considered, a pesticide treated field may favour very different behaviours than one that is managed organically. Another important point is that populations are composed by a multitude of individuals, each with its own behavioural tendencies. Some individuals take more risks when confronted with predators (i.e. they are more bold), others are more active and explore larger areas or consume more prey. These tendencies – often referred to as personality traits – may also be correlated with one another.

In the context of agriculture, this may mean that certain individual spiders may contribute more to biocontrol because they consume more prey, or that certain individuals are more at risk of being in contact with pesticides because they are more active. To understand, how agricultural practices, and particularly insecticidal applications, affects personality and behavioural syndromes in spiders, we focused on the jumping spider *Eris militaris*, an abundant and charming jumping spider occurring in apple orchards in Quebec. Here's a lovely photo from **Crystal Ernst** to illustrate how attractive they are: (thanks, Crystal, for permission to post the photo here!)



We collected spiders from pesticide-treated and pesticide-free orchards, brought them back to the laboratory, and did a number of behavioural tests on the individuals from the two populations. Compared to the insecticide-free populations, we document that individuals from orchards that did receive insecticides experienced a shift in their behaviours syndromes. The overall shape of this syndrome is multidimensional, but it suffices to say that the correlations among different behaviours (the 'syndromes', otherwise known as the 'personality') differed depending on where the population came from.



A 'mirror test' – used to study behaviour in *E. militaris* (photo by R. Royaute)

In sum, the personality shifts that we documented for *E. militaris* are potentially quite important since the relationships between different behaviours may affect a spider's ability to be an effective generalist predator in apple orchards. We need to consider how management (including use of insecticides) may affect specific behaviours, and more importantly, the relationships between the different behaviours.

Reference

Royaute, R., C.M. Buddle & C. Vincent. 2013. Interpopulation Variations in Behavioral Syndromes of a Jumping Spider from Insecticide-Treated and Insecticide-Free Orchards. *Ethology*. doi: [10.1111/eth.12185](https://doi.org/10.1111/eth.12185)