

## Can you safely mix nematodes and pesticides?

Posted on [April 6, 2016](#) by [Sarah Jandricic, Greenhouse Floriculture IPM Specialist, OMAFRA](#)

Entomopathogenic nematodes – **used to control fungus gnats, shoreflies and thrips** – are often a “gateway bio” into biocontrol use in greenhouses. This is because not only are they effective and easy to use, but they’re generally compatible with insecticide use. Readily applied with regular spray equipment or through drip lines, **nematodes can even be tanked mixed with pesticides to save on labour costs.**

In this post, I’ll share some of my research at NC State, looking at **which commonly used pesticides in Canadian and U.S. greenhouses are safe to use with nematodes.**



Infective juveniles (IJs) of *S. feltiae* surrounding an adult thrips. Photo courtesy of R. Buitenhuis (VRIC).

Despite their ability to be stored in the fridge for weeks and applied like pesticides, it’s important to **remember that nematodes are still living animals.** They can be killed or rendered useless by things like **temperature or pressure extremes, lack of oxygen, or exposure to certain chemicals.**

To determine which chemicals nematodes can handle – and which they can’t – researchers often put bios through what we called a “**worst-case scenario trial**”.

Here, we simulated what would happen if a **grower tank-mixed nematodes with a pesticide, and then got called away and left the solution for hours before spraying.** If the nematodes can make it through this, then they can definitely handle being

exposed to the pesticide during a regular (immediate) application with no ill-effects.

We also looked at 2 different measures of what it meant to “be OK” after pesticide exposure. **The first was simple mortality** (what percentage of the nematodes in the solution died?). **The second was infectivity** – i.e. did exposure to the pesticide somehow affect the ability of the nematodes to do their job and kill insects?

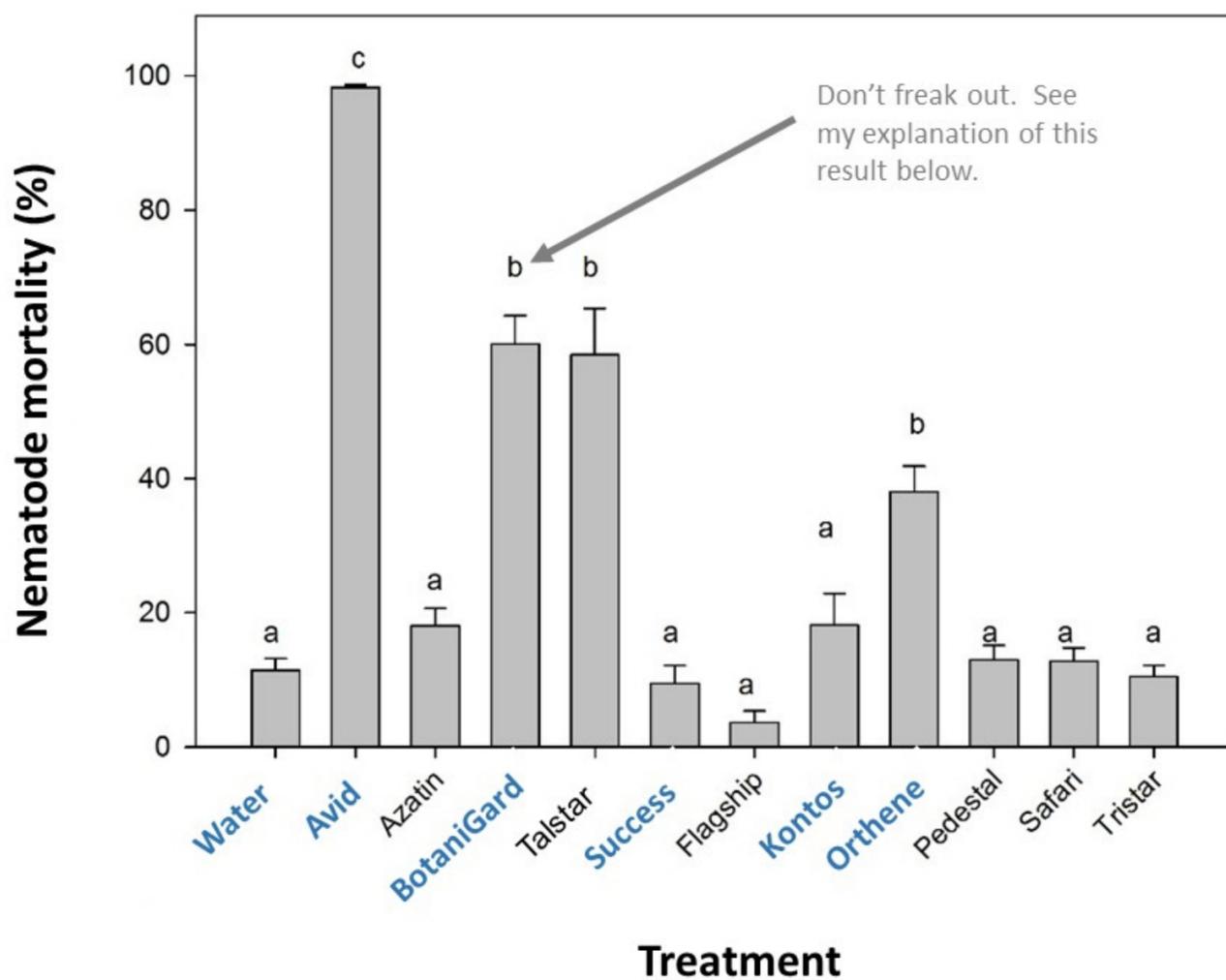


Fig. 1. Percent mortality of *S. feltiae* nematodes exposed for 24h to pesticides commonly used in greenhouses – the higher the number, the more toxic the pesticide. Pesticides registered for use in Canadian greenhouses are indicated in blue. (S.Jandricic and S. Frank, unpublished data).

You can see from Fig. 1, that even in this worst-case scenario, **nematodes generally stood up to most chemicals, with <20% mortality** (statistically, no different than leaving them for long periods in water). **Perhaps more importantly, we saw no ill-effects on the ability of surviving nematodes to infect insects afterwards.**

**Chemicals that caused high mortality to nematodes**, and therefore were of concern, were **Orthene** (acephate, an old-school organophosphate insecticide), **Talstar** (bifenthrin, a pyrethroid) and **Avid** (abamectin, a Group 6 pesticide also used to control plant-pathogenic nematodes in turf).

**These chemicals should be avoided as tank-mixes with nematodes, and also avoided as drenches for at least 7 days before nematode application.** The same can likely be said of other pesticides within these same chemical classes. **For an extensive list of pesticides, fungicides and fertilizers that can be safely tank-mixed with nematodes, [check out this handy-dandy chart from BioWorks.](#)**

Now for those scary looking results with the [bio-pesticide](#) BotaniGard (aka, spores of the insect-attacking fungus *Beauveria bassiana*). **What we need to remember here is that BotaniGard is a [suspension](#)** of fungal spores and carriers – NOT a [solution](#), like the chemical products. This means that if you let it sit without agitation, the inert carriers can settle out (BotaniGard is 78% carrier) and suffocate the nematodes at the bottom of the tank. This is likely what happened here: **there is no research indicating that the fungal spores themselves are harmful to nematodes.**

Recent work done by Taro Saito at the [Vineland Research and Innovation Centre](#) (see Fig 2, below) similarly showed that **nematode survival dropped after an hour of being mixed with the bio-**

**pesticide Met52 EC** (a product containing spores of the fungi *Metarhizium brunneum* in a liquid carrier).

This is likely a result of the oil in the EC formulation causing suffocation if the nematodes are directly exposed for too long.

All of this goes to show that care and common sense need to be taken when mixing *any* product with nematodes.

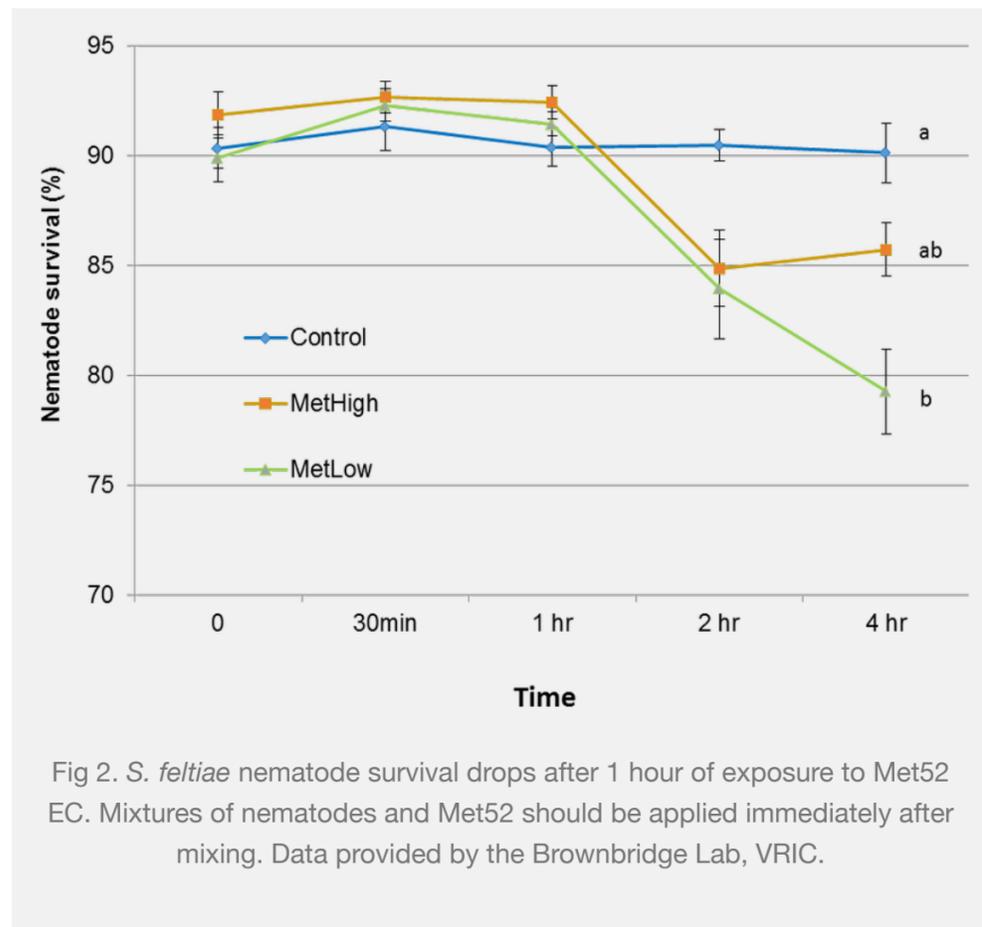


Fig 2. *S. feltiae* nematode survival drops after 1 hour of exposure to Met52 EC. Mixtures of nematodes and Met52 should be applied immediately after mixing. Data provided by the Brownbridge Lab, VRIC.

**If used improperly, fungal-based products can potentially reduce nematode efficacy.** To avoid this, make sure to apply the product right away. Also remember to keep agitation constant.

**“When used correctly”,** *i.e.* by following the label directions, **“NemaShield tank-mixes well with BotaniGard formulations** and the nematode viability is not compromised” stresses BioWork’s new Product Development Manager, Dr. Daniel Peck”. The same can be said for other *Beauveria* (e.g. BioCeres) and nematode products (e.g. Nemasys, Steinernema-System).

By remembering that nematodes are live animals that need specific handling, and taking **a few minutes to check compatibility of any tank mixes**

**BEFORE** you spray, nematodes, pesticides and bio-pesticides can work harmoniously in IPM programs for thrips and gnats. Happy spraying!

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## One Response to *Can you safely mix nematodes and pesticides?*



**[Sarah Jandricic, Greenhouse Floriculture IPM Specialist, OMAFRA](#) says:**

May 4, 2016 at 2:27 pm

This post has been updated to provide clearer information on the combination of entomopathogenic fungi and nematodes in greenhouses.

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