

You catch (and kill) more flies with this sweetener

June 4 2014

In a study that began as a sixth-grade science fair project, researchers at Drexel University have found that a popular non-nutritive sweetener, erythritol, may be an effective and human-safe insecticide.

Erythritol, the main component of the sweetener Truvia, was toxic to *Drosophila melanogaster* fruit [flies](#) in a dose-dependent manner in the Drexel team's study, published in *PLOS ONE*. The flies consumed erythritol when sugar was available and even seemed to prefer it. No other sweeteners tested had these toxic effects.

Based on this discovery, Drexel and the researchers are pursuing a patent on erythritol as an insecticide and are continuing to study its effectiveness.

"I feel like this is the simplest, most straightforward work I've ever done, but it's potentially the most important thing I've ever worked on," said Sean O'Donnell, PhD, a professor of biology and biodiversity, earth and environmental science in Drexel's College of Arts and Sciences, who was a senior author of the paper.

Erythritol is a naturally occurring sugar alcohol that is present in small amounts in many fruits. It has been tested in humans at high doses and found safe to consume; it has been designated as a generally recognized safe food additive by the U.S. Food and Drug Administration since 2001 and is also approved as a food additive in many other countries.

And the new evidence that it is toxic to flies, which are drawn to its sweet flavor even when other foods are available, makes it a killer combination. It is particularly promising because it is safe for human consumption, unlike other pesticides that have caused tragic accidental poisonings such as one that killed 23 Indian school children last year.

This line of research would not have started without the curiosity of one of the paper's co-authors, Simon D. Kaschock-Marenda, who is now in the ninth grade. Three years ago, Kaschock-Marenda questioned why both of his parents had stopped eating white sugar when trying to eat healthier.

"He asked if he could test the effects of different sugars and [sugar substitutes](#) on fly health and longevity for his science fair, and I said, 'Sure!'" recalled Daniel Marenda, PhD, Simon's father and an assistant professor of biology in Drexel's College of Arts and Sciences – and now co-senior author of the study. Father and son proceeded to buy supplies at their local supermarket – as many types of sugar and sugar substitutes as they could find. Marenda's lab supplied "baby" flies and growth medium for his son to raise flies in each of the different types of sweeteners at home, in preparation for the science fair at the Julia R. Masterman School in Philadelphia.

"After six days of testing these flies in our house, he came back to me and said, 'Dad, all the flies in the Truvia vials are dead...'" Marenda said. "To which I responded, 'OK...we must have screwed up somehow. Let's repeat the experiment!'"

Under more rigorous testing conditions in the lab, they replicated their result and knew they were onto something – and could use a hand. "I only use insects to study the brain, so I needed someone who knew something about insects," said Marenda. So he brought the find down the hall to O'Donnell, whose background in entomology suited him to the

task.

Working together, the team further pursued the question of how fruit flies responded to sweeteners – testing flies grown feeding on each of multiple non-nutritive sweeteners as well as sucrose (table sugar) and corn syrup.

Flies raised on food containing Truvia lived for only 5.8 days on average, compared to 38.6 to 50.6 days for flies raised on control and experimental foods without Truvia®. Flies raised on food containing Truvia also showed noticeable motor impairments prior to their deaths.

"Indeed what we found is that the main component of Truvia, the sugar erythritol, appears to have pretty potent insecticidal activity in our flies," Marenda said.

They found that the toxic effect did not come from stevia plant extract, which is present in both Truvia® and the non-nutritive sweetener PureVia. PureVia was included in their experiments and had no [toxic effect](#) on the flies.

"We are not going to see the planet sprayed with erythritol and the chances for widespread crop application are slim," O'Donnell said. "But on a small scale, in places where insects will come to a bait, consume it and die, this could be huge."

The scientists haven't yet confirmed which insects erythritol might kill, other than fruit flies, or how its toxic effects take hold.

The compound is even naturally produced in some insects, which use it as anti-freeze to protect their bodies against cold conditions – but that may not mean much, as their experiments bear out that the dose makes the poison. The researchers plan to conduct further experiments on other

insects such as termites, cockroaches, bed bugs and ants. They will also test erythritol's toxicity as it moves up the food chain by experimenting on praying mantids, which eat [fruit flies](#).

Until further research helps refine the safest and most effective uses of erythritol for insect pest control outside of the lab, can a supermarket dose of Truvia® help get rid of fruit fly infestations in the kitchen? The scientists aren't sure. That might be an experiment to try at home, or for the next science fair.

More information: Paper: [dx.plos.org/10.1371/journal.pone.0098949](https://doi.org/10.1371/journal.pone.0098949)

Provided by Drexel University

Citation: You catch (and kill) more flies with this sweetener (2014, June 4) retrieved 20 March 2024 from <https://phys.org/news/2014-06-flies-sweetener.html>

<p>This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.</p>
--