Tomato plants are covered in tiny anti-pest booby traps

A more detailed understanding of the natural anti-insect protections of tomato plants can lead to better pest-management strategies

By Karmela Padavic-Callaghan on January 10, 2025

The hairs on tomato plants are actually tiny pest traps. Jalaal Research Group/University of Amsterdam

For hungry insects, walking along a tomato stalk in search of a green meal can be like navigating a minefield.

Jared Popowski at the University of Amsterdam in the Netherlands was trying to measure the mechanical properties of tomato plants in the lab. Then a tiny hair on one of the stalks started oozing liquid – and it happened so quickly that his camera barely caught it. He had inadvertently triggered one of the plant's pest-protection mechanisms.

To learn more about how these liquid-filled hairs, called glandular trichomes, work, Popowski and his colleagues created force sensors made with thin glass. Across 84 different measurements, the mean force necessary to rupture a trichome was less than 10 micronewtons. Once the trichome's bulbous top ruptured, it took less than a millisecond to release liquid.

This liquid was too viscous to spray into the air, says Popowski. Instead, it formed a droplet that could stick to an insect. As an insect walks through a forest of trichomes, it will thus accumulate droplets. Becoming increasingly wet then slows it down and prevents it from eating the plant.

The team ultimately recorded this process on camera with nymphs of the Western flower thrips (*Frankliniella occidentalis*), which are a common pest of tomato plants.

Eduardo de la Peña at the Spanish National Research Council says this detailed understanding of the tomato's defences could be useful for developing pest management strategies. For example, we may not need to target pests big enough to trigger trichome rupture, as the plant already has "natural weaponry" against them, he says.

Additionally, researchers know that wild tomato plants have more trichomes than cultivated ones. The new study could motivate breeding between the two in order to add more trichomes to commercially grown varieties.

It also demonstrates the mechanics that empower plants, helping them do more than simply take in nutrients and grow. They also defend themselves with weapons like trichomes and distress signals in the form of chemicals. That is "a lot more than what we learn in school", says Maziyar Jalaal, also at the University of Amsterdam.

Reference

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