

Hydrogel baits offer novel way to manage invasive ants

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Purdue entomologist Grzegorz Buczkowski holds a beaker of dry hydrogel crystals (left) and the same volume of crystals after they have absorbed water (right). Hydrogels saturated with a chemical dissolved in sugar water are attractive baits to Argentine ants. Credit: Purdue University/Tom Campbell

Water-storing crystals known as hydrogels can effectively deliver pesticide bait to invasive Argentine ants, quickly decimating a colony, a Purdue University study finds.

Pesticide sprays and baits are common tactics for managing pest [ants](#). But sprays can have little long-term impact and carry environmental costs such as chemical contamination of soil and water sources. Baits also present challenges: Ants prefer liquid food to solids, rendering granular baits less appetizing. But liquid baits can be difficult and costly to dispense, maintain and clean up.

Associate professor of entomology Grzegorz Buczkowski (GRZHE'-gorzh buch-KOV'-skee) and fellow researchers tested the ability of [hydrogels](#) - crystals that can absorb 300 times their dry weight in water - to deliver liquid bait to [invasive ants](#). They found that hydrogels saturated with a small amount of the chemical thiamethoxam dissolved in sugar water reduced the Argentine ant population in an orchard by about 94 percent in two weeks.

"When you drop hydrogels on the ground next to a colony, the ants really go crazy. It's like a big party," Buczkowski said. "This has great potential for managing invasive ants in other agricultural systems and natural environments. You could treat a whole vineyard using hydrogels."

The Argentine ant is the most widespread species of invasive ant, thriving in urban areas, agricultural settings and nature parks on every continent except Antarctica. The species can form "supercolonies" that link hundreds of nests and millions of workers. While Argentine ants do not bite or sting humans, they can be a nuisance in buildings and cause economic and ecological damage to agricultural businesses and natural areas where they outcompete native ant species.

In orchards and vineyards, the Argentine ant is a stalwart defender of aphids, which excrete a sweet honeydew that the ants drink. The ants protect the aphids from parasites, predators and parasitoids, allowing them to flourish and cause other problems such as sooty black mold, a dark fungus that can block leaves' access to sunlight.



Argentine worker ants feed on hydrogels saturated with sugar water. Credit: Purdue Agricultural Communication photo/Tom Campbell

Buczowski and his team treated a plum orchard colonized by Argentine ants with small piles of hydrogel crystals saturated with 0.007 percent thiamethoxam dissolved in sugar water. Worker ants ate the bait and passed it on to the queens and larvae, decimating the population.

In laboratory tests, the bait crystals killed ant colonies in 3-5 days.

Hydrogel baits are inexpensive, easy to apply, need no dispenser and require a much smaller amount of insecticide than standard baits and sprays, reducing damage to the environment, Buczowski said.

"We can drop the amount of the active ingredient to 0.0001 percent, and it's still effective," he said. "That is about a hundredfold less thiamethoxam than standard liquid baits and about a million-fold less than sprayers dispense."

Hydrogels also offer the advantage of selectively targeting ants, unlike sprays, which can kill beneficial insects such as bees and butterflies as well as pests.

While any ant species could eat the bait, non-target ant species have often been eliminated from areas invaded by Argentine ants or are not able to compete with Argentine ants for food sources - including the bait crystals, Buczkowski said.

Further research is needed to ensure that the hydrogel baits are not attractive to non-target insects, mammals or birds, he said.

The use of thiamethoxam in combination with hydrogels is not yet registered and was used only for experimental purposes in the study.

Using hydrogels to deliver insecticides was first tested by The Nature Conservancy, which teamed up with the National Park Service to rid Santa Cruz Island of Argentine ants. The ants had displaced native ant species on the island and were killing pollinating bees.

The paper was published in *Entomologia Experimentalis et Applicata* and is available to subscribers or through university access at onlinelibrary.wiley.com/doi/10.1111/eea.12239/full

Provided by Purdue University

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