

Scientists Find Natural Way to Control Spread of Destructive Argentine Ants

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Argentine ants attack a much larger harvester ant. In the United States, the invasive Argentine ants live in "super colonies" and generally cooperate with each other. But, altering the recognition cues on the exoskeletons of these ants could spark infighting among the residents of these vast colonies and help check their spread, according to research presented at the 232nd American Chemical Society National Meeting in San Francisco.

Photo: Alex Wild

Pesticides haven't stopped them. Trapping hasn't worked, either. But now chemists and biologists at the University of California, Irvine, (UCI) think they may have found a natural way to finally check the spread of environmentally destructive Argentine ants in California and elsewhere in the United States: Spark a family feud.

The preliminary finding, by UCI organic chemist Kenneth Shea, evolutionary biologist Neil Tsutsui and graduate student Robert Sulc, was described today at the 232nd national meeting of the American Chemical Society, the world's largest scientific society.

Slight alterations in the "recognition" chemicals on the exoskeletons of these closely related pests, these scientists say, could transform "kissing cousins" into mortal enemies, triggering deadly infighting within their normally peaceful super

colonies, which have numerous queens and can stretch hundreds of miles. One colony of Argentine ants is believed to extend almost the complete length of California, stretching from San Diego to Ukiah, 100 miles north of San Francisco. Their sheer numbers, cooperative behavior and lack of natural predators in the United States make these small, slender ants - only about 1/8 of an inch long - difficult to eradicate, Tsutsui and Shea say.

The ants use chemical cues on their exoskeletons to recognize other members of their colony. Because Argentine ants in the California super colony are so interrelated, they have similar "recognition" cues and generally cooperate with each other. But in their preliminary laboratory work, Shea and Tsutsui were able to create a slightly altered, synthetic version of one of these "recognition" compounds, which was composed mainly of linear hydrocarbons with one- to three-side chains called methyl groups. When coated onto experimental Argentine ants, the synthetic recognition compound caused untreated nest mates to attack.

"Our preliminary results strongly suggest that by manipulating these chemicals on the exoskeleton, one could disrupt the cooperative behavior of these ants and, in essence, trigger civil unrest within these huge colonies," Shea says. "Although further study is needed, this approach, if it proves successful, could enable us to better control this pest."

Argentine ants are one of the most widespread and ecologically damaging invasive species, Tsutsui said. When Argentine ants are introduced to a new habitat, they eliminate virtually all native species of ants. These effects ripple through the ecosystem, causing harm to species such as the imperiled Coastal Horned Lizard, which feeds exclusively on a few species of native ants. Argentine ants also cause significant harm to agricultural crops, such as citrus, by protecting aphids and scale insects

from potential predators and parasites.

In their native South American habitat, Argentine ants are genetically diverse, have territories measured in yards rather than miles and are extremely aggressive toward encroaching colonies, literally tearing one another apart in battle, according to Tsutsui. But North American colonies are different. Because they are believed to be descended from a single small population of genetically similar ants, Argentine ants in United States essentially “recognize” each other as members of the same clan, he said.

“The final goal of this project would be to recognize the colony markers that distinguish one colony from another,” Shea said. “Once we have an understanding of those markers, then it might be possible to use synthetic mixtures of hydrocarbons to either confuse or confound or otherwise disrupt social behavior.”

Argentine ants were likely carried into the United States in the 1890s aboard cargo ships that docked in Louisiana. Although the proliferation of the ants has been slowed in the South and Southeast by the introduction of fire ants, Argentine ants are now the most common ant in California, Shea said.

Source: American Chemical Society

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