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What's eating aphids?

Invasive parasitic wasps helping to control soybean aphids in Minnesota fields

BY Isaac Popp, CCA

Is something eating soybean aphids?

Let's hope so!

One of the best ways to achieve long-term control of soybean aphids is to foster their natural enemies.

Lady beetles, lacewings, parasitic wasps, and other insects that feed on soybean aphids can be very effective at regulating aphid populations. Now that some of our chemical weapons are breaking down due to increasing aphid resistance, natural enemies are more important than ever.

To protect these valuable insects, it's important for growers to practice good integrated pest management. That means scouting for aphids and waiting to spray until aphid numbers reach economic thresholds.

A beneficial invader

One of the most important groups of natural aphid enemies are the parasitic wasps. These tiny stingless insects inject their eggs into soybean aphids. When the eggs hatch, the larvae devour the aphids from inside, then form cocoons within their dead hosts' bodies, which are called "aphid mummies."

Sounds like a horror movie, right?

In their native Asia, parasitoids keep aphids in check most of the time without insecticides. The USDA has attempted to introduce two species of Asian parasitic wasps into Midwest soybean fields — a tactic known as classical biological control. So far, though, these introduced wasps have failed to take hold, says University of Minnesota assistant scientist Jonathan Dregni.

But recently, another beneficial foreign wasp called *Aphelinus certus* has become established in North America. The aphid-eating species was first detected in Pennsylvania in 2005 and is spreading fast. The wasps arrived in Minnesota about 2011, and since then have been seen in soybean fields throughout the state, Dregni says.

Nobody knows how *Aphelinus certus* got to this country. "It wasn't intentionally introduced," says Robert Koch, University of Minnesota Extension entomologist. In fact, the USDA had studied *Aphelinus certus* but decided not to release it because it's not an especially picky feeder. "It likes to feed on lots of aphid species," Koch says.

Protecting friendly insects

Aphelinus certus can lower spring soybean aphid colonization, reducing later outbreaks, Dregni says. In a recent field experiment he compared the effectiveness of *Aphelinus certus* to neonicotinoid seed treatment for early-season aphid control. He found that four weeks after soybean planting, just two female wasps reduced aphid densities as well as the seed treatment.

Unfortunately, broad spectrum insecticides, such as seed treatments and foliar sprays, not only kill soybean aphids, but friendly insects, too.

How can you protect *Aphelinus certus* and other natural aphid enemies?

The most important thing you can do to minimize collateral damage — and avoid unnecessary expense — is to adopt economic thresholds for spraying. Scout for aphids beginning in mid- to late-July through R6.5. Don't spray unless aphid numbers reach 250 aphids per plant on more than 80 percent of plants in the field.

I know this sounds like a lot of aphids, and growers may be tempted to spray sooner. But remember that economic injury to soybeans does not occur until aphid numbers reach 650 per plant. The economic threshold of 250 aphids gives you a good five days to spray before yield losses begin.

Be sure to scout three to five days after you spray to make sure the treatment was effective. [Failures of pyrethroid insecticides](#) on soybean aphids have been reported for the past three years in Minnesota. To manage aphid resistance, you must also rotate insecticide modes-of-action from year to year, and within the season.

Surveying wasps

Natural enemies like *Aphelinus certus* can also help manage insecticide-resistant aphids.

The Minnesota Department of Agriculture and the University of Minnesota have been surveying *Aphelinus certus* for several years.

“The wasp has spread throughout Minnesota,” Koch says, “and the numbers are increasing over time. That’s a good sign for aphid management.”

One of the goals of the survey is to understand how much parasitism is required to suppress aphids without added inputs, Dregni says. A [2014 Minnesota survey](#) found *Aphelinus* parasitism rates as high as 88 percent of aphids in a field. Eventually, researchers hope to incorporate natural enemy densities into soybean aphid treatment thresholds.

[In 2017](#), scouts visited 43 Minnesota counties, collecting thousands of aphid mummies. The survey will be repeated this summer, and researchers are looking for additional cooperators. Researchers hope to collect samples from most Minnesota soybean-growing counties in 2018.

If you are willing to participate in this important survey, please email coordinator Jonathan Dregni at mummyscout@gmail.com, and include soybean field locations. The 2018 survey will take place between July 15 and August 15.

Popp is a certified crop adviser with Centra Sota Cooperative in Little Falls. Find information and links to Minnesota CCAs at <http://www.mcpr-cca.org>

Key Points

- Natural enemies can help suppress soybean aphids.
- *Aphelinus certus* is a beneficial parasitic wasp that feeds on soybean aphids.
- Cooperators are needed for a 2018 survey of soybean aphids and parasitoids.

Contact: mummyscout@gmail.com

[Graphics]

[Optional sidebar box]

Consider aphid-resistant soybean varieties

Another sustainable way to manage soybean aphid resistance and protect natural aphid enemies is to plant [aphid-resistant soybean varieties](#).

Soybeans that possess resistance genes called *Rag* genes have proved effective at suppressing aphids without a yield penalty, says University of Minnesota entomologist Robert Koch. Commercial soybean varieties that contain *Rag* genes are still limited for northern relative maturity groups, but offer promise for future aphid management.

[Optional Photo captions]

1. Mummies on leaf

Photo credit: Jonathan Dregni

RECOGNIZE MUMMIES. Look for black- or tan-colored aphid mummies attached to soybean leaves when scouting. Here, aphids parasitized by wasps are mixed in a soybean aphid colony. The stingless wasps themselves are smaller than a gnat and hard to see.

2. Black and tan mummies

Photo credit: Jonathan Dregni

BLACKS AND TANS. Soybean aphids have been parasitized by a native parasitoid, *Lysiphlebus testaceipes* (tan mummies) and a recently-arrived foreign parasitic wasp, *Aphelinus certus* (black mummies). The parasitic larvae feed on the soybean aphids internally, causing the host's body to become bloated and discolored.

3. Wasp and aphid

Photo credit: Matt Kaiser

BENEFICIAL NATURAL ENEMY. A parasitic wasp from the genus *Aphelinus* parasitizes a soybean aphid.

[Map captions]

4. Aphid population map

Graphic credit: Jonathan Dregni and Jacqueline Nuzzo

Survey results for soybean aphid populations in Minnesota in 2017. (Counties shaded in brown were not sampled.) The highest aphid densities were found in central and northwestern Minnesota last year. The survey will be repeated in 2018.

5. *Aphelina certus* map

Graphic credit: Jonathan Dregni and Jacqueline Nuzzo

Survey results for the parasitic wasp *Aphelinus certus* populations in Minnesota in 2017. (Counties shaded in brown were not sampled.) *Aphelinus certus*, a beneficial natural aphid enemy, first arrived in Minnesota about 2011 and has been spreading

and increasing in number. Researchers are seeking Minnesota cooperators for a 2018 survey.