

PG. 32 As your pest threat grows, so does the value of biosecurity

PG. 36 Drone cameras are finding problem spots. Now, can they recommend solutions too?

CROPS GUIDE

PROTECT THE MIGHTY MICROGASTRINAE

More and more, we're learning that farmers can save a lot of money in both the short and long term by taking advantage of opportunities to help the insect world police itself

BY JAY WHETTER / CANOLA COUNCIL OF CANADA

Hector Carcamo was in a southern Alberta canola field in 2018 sweep-netting for cabbage seedpod weevils when what did he find? Little black wasps. Lots of them. Same thing in the next sample site. And then the next. Field to field.

"We were consistently finding them. With every set of sweeps we found three, five, 10 of these wasps in the net," says the research entomologist with Agriculture and Agri-Food Canada (AAFC) in Lethbridge.

It was a bit of a mystery. Carcamo, a specialist in lygus bugs and cabbage seedpod weevils, could not immediately identify this wasp. So he showed samples to his AAFC Lethbridge colleague Vincent Hvet. He said they were a Microgastrinae wasp and he had an inkling they were *Diolcogaster claritibia*, a species he had collected in southern Alberta beneficial insect surveys in 2011.

Hvet and Carcamo emailed insect taxonomist José Fernández-Triana to make sure. Fernández-Triana is with AAFC's Canadian National Collection of Insects (CNC) in Ottawa and, as a taxonomist, his speciality is identifying and naming insects.

"Hi Hector and Vince, I am very happy to see your messages and I will do my best to help," he replied. "What I would need to be 100 per cent sure is a better view of the hind legs (including the coxa). And, ideally, a picture of the first two abdominal segments."

He added, "Microgastrinae is my bread and butter, so I am in a position to help as much as possible (and also willing to do that!)."



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It doesn't always work. It has to be based on science. Not every little flying creature is beneficial. For comparison, this is the newly identified canola flower midge, which is similar in size to the two beneficial wasps shown on page 30. But as a fly, it only has two wings compared to the wasps' four. AAFC canola flower midge specialist Boyd Mori says counting wings would be difficult without a hand lens or microscope. Mori describes the midge as "delicate looking and light in colour (usually beige to light brown). Female's wings are covered in tiny hairs, which gives them a mottled appearance." PHOTO: BOYD MORI



Another wasp and another diamondback moth parasitoid, *D. insulare* is from Central America and does not overwinter. It comes on spring winds from the south, along with diamondback moths. Besides being about twice the size of *Diolcogaster*, *D. insulare* is still a tiny wasp and with the naked untrained eye would be difficult to distinguish from a *Diolcogaster*.

PHOTO: SADIA MUNIR, STRICKLAND MUSEUM

WHICH WASP IS IT?

Carcamo sent photos and mailed actual specimens so Fernández-Triana could check the coxa (the joint where the leg meets the body), abdominal segments, and all other parts necessary to make a species identification. This is harder than it sounds. These wasps are only two millimetres from tip to tip and the website 'Microgastrinae Wasps of the World' says the Microgastrinae group alone has over 2,700 known species. The wasp world, like so many insect families, is massive.

With the required attention to minute details, Fernández-Triana confirmed Herve's initial thought. The wasps were *Diolcogaster claritibia*.

Does an accurate identification of some tiny wasp really matter? "It does," says Carcamo, "because if we know the species, then we know what they eat."



As a wasp, *D. claritibia* has four wings, dark colour and an armoured look common to many wasps. Body length is about two mm. PHOTO: JOSÉ L. FERNÁNDEZ-TRIANA

Parasitoid wasps are often specialists. One species will rely on one specific host for egg-laying and parasitization. *D. claritibia* adults lay their eggs inside the larvae of diamondback moth. Whether *D. claritibia* will opt to lay eggs in other caterpillars when diamondback moths are not available is not known at this time. The wee wasp larvae, after hatching, eat their way out, like Medusa's hair of snakes, and kill the host in the process. Parasitoid wasps do not sting. They are allies through and through, doing no

harm to humans while knocking back our plant-eating foes.

Carcamo suspects that higher-than-normal diamondback moth numbers in 2017 caused the high number of *D. claritibia* in southern Alberta in 2018. And because these wasps were so plentiful in 2018, it probably means they hunkered down and survived the 2017 winter. In lab tests, Herve found *D. claritibia* to be very cold hardy and says they probably do overwinter in Western Canada. Carcamo is working with Shara-

“ And by spraying only when numbers are over thresholds, this also saves the life of beneficials like *D. claritibia* and many others, which can save farmers even more money in the long run.” — *Hector Carcamo, AAFC*

vari Kulkarni, a post-doctoral fellow with professor Maya Evenden at the University of Alberta, on a lab colony to do more studies on this species.

SPRAYING COUNTERPRODUCTIVE?

Meantime, beneficial parasitoid wasps at these populations will continue to significantly reduce pest pressure. On the Prairies, heavy parasitism of diamondback moth in particular already keeps that pest insect in check most years.

Researchers are also seeing evidence of a whole-farm effect, where spraying one field can have a direct influence on parasitism of a completely different pest in another field the same year or the same field the following year. Carcamo references work by Finnish researcher Heikki Hokkanen, who found that spraying for aphids in cereals also wiped out a parasitoid of pollen beetle, which is one of the most important pests of oilseed rape (canola) in Europe. Hokkanen found that pollen beetles in canola are worse than they would have been because the farmer sprayed for aphids in wheat the previous year.

“It seems we may have a similar but opposite situation in Western Canada,” Carcamo says.

Bracon cephi, a common parasitoid of wheat stem sawfly, is emerging from wheat stubble in canola fields about the same time as farmers are spraying for cabbage seedpod weevil in canola. This spray can kill *Bracon cephi*, stopping them from flying to neighbouring fields to parasitize wheat stem sawfly larvae, he says.

This whole-farm ecosystem effect makes it “really important” to follow thresholds for all insects, all the time, Carcamo says.

Know the threshold numbers. And sample properly. “Sampling only at field edges tends to provide an inflated insect count,” Carcamo says. He recommends, at a minimum, sampling at the field edge, then again 50 to 100 steps into the field and one more time on the opposite side of the field.

“Farmers can save a lot of money by not spraying because they’re following thresholds,” Carcamo says. “And by spraying only when numbers are over thresholds, this also saves the life of beneficials like *D. claritibia* and many others, which can save farmers even more money in the long run.” **CG**

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Thresholds for common canola pests

- **Bertha armyworm:** 20 per square metre is typical. The actual number depends on canola prices and spray costs.
- **Cabbage seedpod weevil:** 25-40 per 10 sweeps.
- **Cutworm:** 25-30 per cent stand reduction, in general, but thresholds can be species specific.
- **Diamondback moth larva:** 100-150 larvae per square metre in immature to flowering plants or 200-300 in flowering/podding plants (in dense stands).
- **Flea beetle:** >25 per cent cotyledon defoliation if flea beetles are still feeding on newly developing plants. Canola can recover from 50 per cent loss of cotyledon with no yield loss.
- **Grasshopper:** Eight to 12 per square metre.
- **Lygus bug:** Three to five lygus per 10 sweeps is a typical threshold in dry conditions (the actual number depends on canola price and spray costs) but will be quite a bit higher (50 per 10 sweeps) in moist and high-yield conditions.

To find more on thresholds, scouting tips and timing for each specific insect pest, check the “Insects” section at canolaencyclopedia.ca.