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Research and Extension

Aphidius colemani and *Aphidius ervi*
Biological Control Agents of Aphids

Aphidius colemani and *Aphidius ervi* are parasitoids that can be released into greenhouse production systems to manage aphid populations on ornamental and vegetable crops below plant-damaging levels. This publication provides information on the biology and behavior, commercial availability, use in greenhouses, and quality assessment of *Aphidius colemani* and *Aphidius ervi*.

Biology and Behavior

Aphidius colemani is black, approximately 1⁄16 to 1⁄8 of an inch (2 to 3 millimeters) in length, with extended antennae (Figure 1A). After mating, a female can produce both fertilized and unfertilized eggs. Fertilized eggs produce females and unfertilized eggs produce males. The female uses an egg-laying device called an ovipositor to insert a single egg into an aphid (Figure 1B). The larva that emerges (ecloses) consumes the inside body contents of the aphid, which eventually becomes a golden-brown to gray mummified (parasitized) aphid (Figures 2A and 2B). After five to 10 days, an adult parasitoid emerges from a circular opening in the back of the mummified aphid and searches for new aphids to lay eggs. A female can lay more than 300 eggs in four to five days, inserting a single egg into an aphid. Most eggs are laid during the first three days after an adult emerges (ecloses) from the mummified aphid. *Aphidius colemani* prefers to lay eggs into the green peach aphid, *Myzus persicae*, and the melon/cotton aphid, *Aphis gossypii*.

The life cycle, from egg to adult, takes 14 days at 70 degrees Fahrenheit (21 degrees Celsius) and 20 days at 59 degrees Fahrenheit (15 degrees Celsius). Adults live about 10 days at temperatures between 64 and 72 degrees Fahrenheit (18 to 22 degrees Celsius). *Aphidius colemani* is less active at temperatures above 86 degrees Fahrenheit (30 degrees Celsius), which decreases their ability to manage aphid populations.

Aphidius ervi is black, approximately 1⁄8 to 1⁄4 of an inch (4 to 5 millimeters) long, with extended antennae (Figure 3). A female touches an aphid with her antennae to assess the size of an aphid, which determines the quality for larval survival and development. Then the female inserts an egg into the aphid using her ovipositor. A larva emerges (ecloses) from the egg and consumes the inside body contents of the aphid producing a mummified aphid. The larva then creates a slit and attaches the mummified aphid to the plant leaf. The larva creates a silken cocoon and pupates inside the mummified aphid. After five to 10 days, an adult emerges from a circular opening in the back of the mummified aphid and searches for new aphids to

Figure 1A. *Aphidius colemani* adult (Raymond Cloyd).
Figure 1B. *Aphidius colemani* female inserting ovipositor into an aphid (Biobest).

Figure 2A. Mummified (parasitized) aphids on leaf underside (Raymond Cloyd).
Figure 2B. Close-up of mummified (parasitized) aphids (Raymond Cloyd).

lay eggs. An *Aphidius ervi* female can lay approximately 50 eggs per day, five to seven days after emerging from mummified aphids. *Aphidius ervi* prefers to lay eggs into the potato aphid, *Macrosiphum euphorbiae*, and foxglove aphid, *Acyrthosiphon solani*.

The life cycle of *Aphidius ervi* is similar to *Aphidius colemani* but takes longer to complete. For example, the life cycle, from egg to adult, takes 12 days at 75 degrees Fahrenheit (24 degrees Celsius), 19 days at 70 degrees Fahrenheit (21 degrees Celsius), and 29 days at 59 degrees Fahrenheit (15 degrees Celsius). Adults are less active when temperatures are above 86 degrees Fahrenheit (30 degrees Celsius) and below 46 degrees Fahrenheit (8 degrees Celsius).

Commercial Availability and Use in Greenhouses

Aphidius colemani and *Aphidius ervi* are available from distributors and suppliers of biological control agents as a mixture in containers with sawdust, as the carrier, and mummified (parasitized) aphids. Place the contents of the container near plants infested with aphids (Figure 4) or into Petri dishes distributed throughout the greenhouse (Figure 5). The parasitoids must be released or introduced early in the cropping cycle to manage aphid populations before they reach plant-damaging levels.

One way to improve the effectiveness of *Aphidius colemani* and *Aphidius ervi* in managing aphid populations in greenhouse production systems is by using banker plants. Banker plants are noncrop plants that provide additional prey for parasitoids of greenhouse insect pests. In this case, the banker plants are infested with the bird-cherry oat aphid, *Rhopalosiphum padi* (Figure 6), which is an alternative aphid species that the parasitoids can use to lay eggs and increase their numbers. Both *Aphidius colemani* and *Aphidius ervi* can be reared on banker plants, such as, barley, *Hordeum vulgare*; rye, *Secale cereale*; or common wheat, *Triticum aestivum;* that are infested with the bird-cherry oat aphid. The bird-cherry oat aphid does not feed on the main greenhouse crops.

Place banker plants among the main crops that are susceptible to aphids or near plants prone to early aphid infestations (Figure 7). The parasitoids will move from the banker plants to the main crops and vice versa. More parasitoid adults will be produced as long as bird-cherry oat aphids are present on the banker plants. A general recommendation is to place two banker plants per acre within the greenhouse. Contact the distributor or supplier

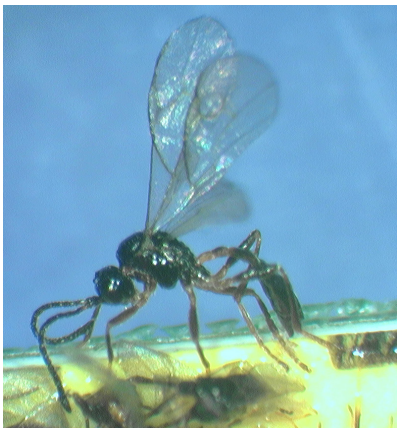

Figure 3. *Aphidius ervi* adult (Raymond Cloyd).

Figure 5. Petri dish with sawdust and mummified (parasitized) aphids placed among a crop (Raymond Cloyd).

Figure 4. Container with sawdust (carrier) and mummified aphids parasitized by *Aphidius colemani* and *Aphidius ervi* (Raymond Cloyd).

Figure 6. Bird-cherry oat aphids on banker plant (Raymond Cloyd).

of biological control agents to obtain information on how to start your own banker plants.

Quality Assessment

Use the following procedures to verify that *Aphidius colemani* and *Aphidius ervi* received from distributors or suppliers of biological control agents are emerging from mummified aphids.

1. Evenly distribute the contents of the container (sawdust and mummified aphids) into two plastic containers (Figure 8).
2. Attach a 2 × 2 inch (5 × 5 centimeter) yellow sticky square to the underside of each plastic container (Figure 9A).
3. Using a microscope, record the number of adult parasitoids captured on the yellow sticky square (Figure 9B) after two, four, and six days. Note the difference in size between *Aphidius colemani* and *Aphidius ervi* (Figure 10). Contact the distributor or supplier of biological control agents to determine the number of adult parasitoids that should emerge from the container.

Figure 7. Banker plant placed among the main crops (Raymond Cloyd).

Figure 8. Contents of container with sawdust and mummified (parasitized) aphids evenly distributed between two plastic containers (Raymond Cloyd).

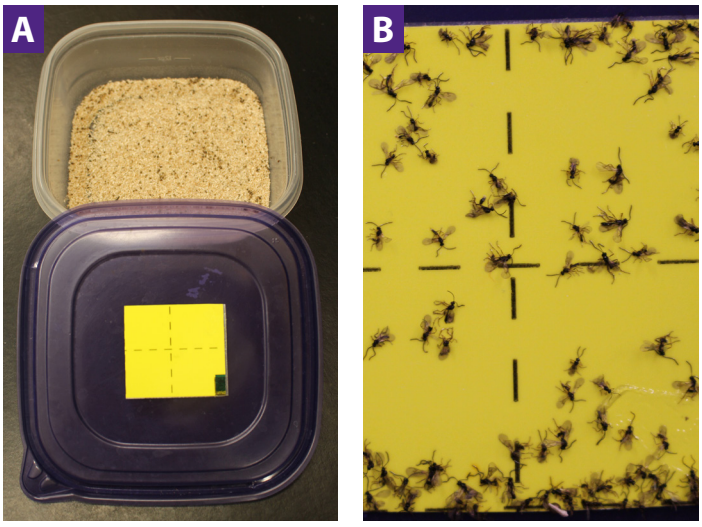

Figure 9A. Yellow sticky card attached to the underside of plastic container lid (Raymond Cloyd).
Figure 9B. *Aphidius colemani* and *Aphidius ervi* adults captured on yellow sticky square (Raymond Cloyd).

Figure 10. Adult *Aphidius colemani* (bottom) and *Aphidius ervi* (top) on yellow sticky square (Raymond Cloyd).

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