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Aphid Natural Enemies and Biological Control

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What You Should Know

- Aphids are prey to many predatory insects, spiders, and parasitoids.
- Healthy predatory populations keep aphid populations low, which can reduce or eliminate the need for chemical controls.
- Broad-spectrum insecticides will often reduce predator populations and result in increased pest outbreaks of aphids.
- Predator life cycles tend to lag behind the rapidly reproducing aphid, so several strategies may be needed to encourage their success.
- Diverse plantings and avoiding broad-spectrum insecticides can encourage predator success.

INTRODUCTION

Aphids are sap-feeding insects that emerge early in the spring. They have piercing-sucking mouthparts and in many cases can carry and spread plant diseases. Aphids can be small, like the green peach aphid, to quite large, like the conifer aphid. The color of the various aphid species is diverse and includes black, green, red, and yellow. They are soft-bodied with the most apparent identifying characteristic being two "tailpipes," called cornicles, protruding from the posterior end. Gardeners and homeowners often see aphid excrement or honey dew on leaves, leaf curl with aphids hiding in the curl on fruit trees and landscape plants, or an abundance of the aphids on the underside of leaves and on plant stems.

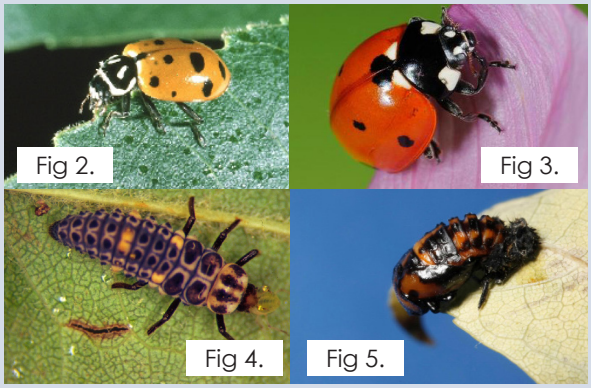
There are several naturally occurring species of predators that feed on aphids. Often the benefit of these naturally occurring predators is overlooked until predator populations are disrupted by factors such as an insecticide application or changes in the environment, like weather. In these situations, pests like aphids escape from being eaten and reproduce rapidly. Thus, it is important to scout for predatory insects and eggs amongst aphid populations and be mindful of the predator community when considering aphid control options. Although resident predator populations can maintain aphids at low levels, predators do not show up until there is a food source, so there can be a lag time between the appearance of the aphids and the appearance of predators. With aphids occurring early in the season and reproducing rapidly, it is not uncommon for them to quickly outnumber predators and their rate of feeding on aphids. Therefore, adjustments to the local environment and releases of beneficial insects may be needed to enhance their presence and effectiveness. This fact sheet lists common arthropods of Utah that eat aphids, will help identify those arthropods, and will describe management practices that aid in their success. Many of these predators will eat other plant damaging insects in addition to aphids.

An alfalfa plant covered in cowpea aphids.

DEFINING THE BENEFICIALS

Beneficial arthropods that aid in pest suppression can be categorized as **predators** or **parasitoids,** and **generalists** or **specialists**. Predators kill their prey immediately and require many of them to complete their development. Parasitoids lay their eggs inside or on their prey, complete their development in the individual, and eventually kill it. Many predators are generalists, meaning that they eat many different species of prey. Some predators do have a specialized or specific diet. Most parasitoids are specialists, in that they have a specific host in/on which they deposit their eggs and develop.

COLEOPTERA (BEETLES)



Ladybeetles, Ladybugs, or Ladybird Beetles

Ladybeetles are probably the most well-known of beetles that eat aphids. There are many species, and both the adults and larvae eat aphids. Convergent lady beetles (Fig 2) and the seven-spotted ladybeetles (Fig 3) are abundant species in the environment. Eggs are found in clutches, yellow and football shaped. Larvae have an alligator-like appearance, and are black with orange markings (Fig 4). Pupae are sedentary (Fig 5). Ladybeetles are commercially available but purchasing is not generally recommended since the adult stage tends to fly away once released. Introductions may be more effective in greenhouses and high tunnels. Diverse plantings can help recruit resident ladybeetles to an area.

Soft-winged Flower Beetle or Collops Beetle

Collops beetles are active in agricultural fields including alfalfa and are found in landscapes and gardens. The adult eats aphids and the larvae are active predators in the soil. Two abundant species in Utah are the two-spotted melyrid (Fig 6) and the soft-winged flower beetle (Fig 7). Collops beetles are not commercially available.

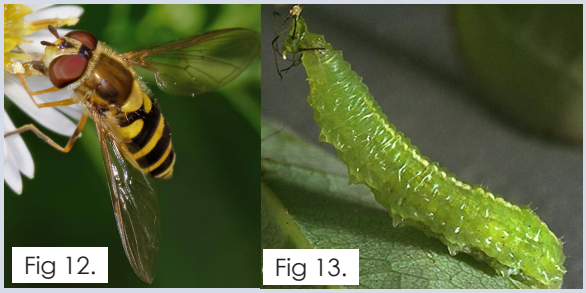
Soldier Beetles

The adult stage of the soldier beetle (Fig 8) eats aphids. The larvae live in the soil and help to control soil-borne pests. There are beetles that look similar to soldier beetles such as blister beetles (Fig 9) and click beetles, so use care when identifying them. Soldier beetles are not commercially available.

DIPTERA (FLIES)

Long-legged Flies

There are many species of long-legged flies (Dolichopodidae), the adults of which are predators of soft-bodied pests. The adult is recognized by the long legs and tapered abdomen but also by the metalic green or blue color (Figs 10-11). They are not commercially available.



Syrphid, Flower, or Hover Flies

Syrphid flies (Fig 12) are about the size of house flies and hover in flight. The adults, which sometimes resemble bees, are not predaceous, but the larvae are aphid predators. The larvae vary in color from green to brown, some with a stripe or two down the back (Fig 13). The body tapers to the mouthparts. Syrphid flies are not commercially available.

Predaceous Midges

The larvae of these flies are very small (~1/10 inch long), but are generalist predators of mites, aphids and other soft-bodied insects. The larvae are yellow to orange in color (Fig 14). The adults are not predatory. Predaceous midges are commercially available.

HEMIPTERA (TRUE BUGS)

Fig 15.

Damsel Bugs

These true bugs are very common and abundant in farms, gardens and landscapes. They are generalist predators and both the adults and nymphs eat aphids and other soft-bodied insects, especially on shorter growing plants. They are not as common in tree crops. Damsel bugs are greyish brown in color and have grasping front legs (Fig 15). They are not commercially available. More detail can be found in the USU Extension fact sheet on Damsel Bugs.

Fig 16.

Big-eyed Bugs

Big-eyed bugs are small (~3/16 inch long), fast moving true bugs. They are generalist predators and are most commonly seen on the ground or in shorter growing plants. They are distinguished by their very large eyes which are as broad as the width of their body (Fig 16). Big-eyed bugs are not available commercially. More detail can be found in the USU Extension fact sheet on Big-Eyed Bugs.

Fig 17.

Minute Pirate Bugs

Minute pirate bugs are very small (~1/12 inch long) predators that are difficult to see without a hand lens or jeweler's loupe. They are generalist predators that feed on small insect prey. Both the nymphs and adults are predaceous. The adults are idenfied by the black and white color and an X pattern across the back (Fig 17). The nymphs are tiny and red to orange in color. Minute pirate bugs are commercially available.

NEUROPTERA (LACEWINGS)

Fig 18.

Fig 19.

Lacewings

Green lacewings (Fig 18) are common generalist predators that feed on aphids. Brown lacewings are slightly smaller. Some species of adult lacewings are predaceous while the larvae (Fig 19) are very active predators that feed on soft-bodied prey such as mites, aphids, leafhoppers, thrips, whiteflies, and pest eggs. Lacewings in nearly all life stages are commercially available.

HYMENOPTERA (WASPS)

Fig 20.

Fig 21.

Parasitic Wasps

There are several species of parasitoid wasps that parasitize aphids specifically. Parasitic wasps that specialize on aphids are very small (~1/8 inch long) and female wasps have a modified stinger for depositing eggs (Fig 20). The egg is injected into an aphid where the larva develops inside. Parasitized aphids are a light tan to gold color and have a bulbous look (Fig 21). A circular cut out on the rearend of the aphid indicates adult wasp emergence. Parasitic wasps are commercially available but there are abundant populations in the environment.

Fig 22.

Fig 23.

Hornets, Paper Wasps, Yellow Jackets

Although hornets, paper wasps and yellow jackets (Figs 22-23) are often considered a nuisance, they are predators of soft-bodied insects. They do not typically sting humans unless they are disturbed. If their nests are not in an area likely to be disturbed by people then it is not a bad idea to leave them alone.

OTHER SPECIES

There are other species that prey on aphids to one degree or another. These include:

Spiders

Spiders are generalist predators that prey upon aphids. Spiders have several modes of capturing prey. For more detail visit the USU Extension fact sheet on Spiders.

Earwigs

Although earwigs can be plant pests they can be effective predators of apple aphids and wooly apple aphids (Fig 24). For more detail visit the USU Extension fact sheet on Earwigs.

Assassin and Ambush Bugs

These are true bugs and are generalist predators that include aphids in their diet. Assassin bugs are larger than damsel bugs and resemble a thin version of a leaf footed bug. The related ambush bug has a blocky, rough appearance (Fig 25).

Fig 24.

Fig 25.

Aphid Wasps

Aphid wasps burrow into the pith of dead stems, where they lay eggs and pack in aphids to feed the emerging young. The larvae consume the aphids then pupate and emerge as adults (Figs 26-28).

Fig 26.

Fig 27.

Fig 28.

MANAGEMENT

Managing for Predators/Promoting Beneficials

- **Conservation**

  When predatory insects are already present in sufficient numbers there are some conservation practices that will help maintain the populations.

  - Provide habitat—perennial plantings or border plantings. This promotes alternative food resources from different flowers and provides a corridor for predators and parasitoids to move throughout the landscape during the season.
  - Soft approaches for aphid suppression include removal with a stiff spray of water, insecticidal soap, and horticultural oil.
  - Time spray activities in early spring to coincide with emergence of immature aphids.
  - Use of systemic rather than contact insecticides.

- **Augmentation**

  In cases where the predator population has been reduced through mismanagement, a disturbance, or the natural response is too slow and crop damage is imminent, then the predator population can be augmented by purchasing the desired species and releasing them into the habitat. Not all predators or parasitoids are available commercially, but judicious augmentation of beneficial insects can help keep crop and landscape plant damage within acceptable levels.

CONCLUSION

There are several Integrated Pest Management (IPM) practices that can slow down the aphid population while the predator population gets established. When the aphids first show up in the spring, a strong blast of water on the underside of leaves will knock a lot of aphids off the leaves, limit their damage, and allow predators and parasitoids to increase their populations. Non-chemical insecticides, such as horticultural oil or insecticidal soap are more damaging to the early aphid populations than the predators, and without residual effects. When using broad-spectrum insecticides, consider using systemic insecticides that reduce exposure of the chemical to the predators and parasitoids.

Aphids have many enemies. Keep in mind that poorly timed, or indiscriminate, insecticide applications can be more damaging to predator populations than to aphids. When scouting for aphids also look for these beneficial predators and parasitoids as well.

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