



Figure 1. Flea beetles on arugula

Flea Beetles in the Garden

When holes appear on the leaves of garden plants, there is a likely culprit: the flea beetle. The flea beetle is a yearly visitor in Montana and a frequent guest in most places where potatoes, tomatoes, and cruciferous vegetables are grown.

In Montana, there are approximately 29 species of flea beetles. However, only a few dominate in Montana gardens, including the western black flea beetle (also known as the western cabbage flea beetle), *Phyllotreta pusilla*, which is shiny and black; the crucifer flea beetle, *Phyllotreta cruciferae*, which is a blu-ish/black metallic color; and the cabbage flea beetle, *Phyllotreta albionica*, which is bronze and metallic. The adult beetles range from two to four millimeters in size.

Although feeding host plants may overlap, many species have preferences. Some beetles prefer plants in the cruciferous, or cabbage, family (broccoli, cabbage, Brussels

sprouts, turnips, and radishes) while others prefer plants in the nightshade family (tomatoes, potatoes, and eggplants). Other species have a broad host range and will feed on plants in both families. The western black flea beetle has a very broad host range and can be damaging to several garden plants. Alternate hosts for flea beetles include weedy plants in the mustard family, including field pennycress (*Thlaspi arvense*), tansy mustards (*Descurainia* species, which includes flaxweed), and pepperweeds (*Lepidium* species).

The characteristic damage from flea beetles is “shotholes” on the foliage (Figure 1). Adults chew small, circular holes on the upper surface of the leaves, leaving the lower epidermis intact. Seedling chewing, if severe, can cause necrosis and death of the tissue. Severe injury can also occur in the spring with hot and dry weather. Some plants are more tolerant than others, including those that are more mature and established.

The larvae (immatures) typically feed on roots, which can reduce the market value of certain root crops, such as radishes and rutabaga. Otherwise, the larval feeding damage is minimal. The larvae of some non-vegetable feeding flea beetle species chew or “skeletonize” entire leaves, rather than a shothole-type pattern.

The adults are strong fliers and can fly long distances. They have enlarged hind legs and tend to jump when disturbed, which gives them their “flea” beetle name. They prefer to feed on young seedlings, particularly those with six or fewer leaves. On mature plants, they tend to feed on the lower, older leaves. Weeds can serve as early-season hosts for feeding when the adult beetles emerge from overwintering sites.

Most species spend the winter as adults in leaf litter and protected areas close to their host plants. For most of the species feeding on our garden plants, the rest of their life cycle (egg, larval, and pupal stages) is spent in the soil. There are typically one to three generations per year, depending on the species.



Management of flea beetles:

Flea beetle control involves an integrated management approach

NON-CHEMICAL APPROACHES

To combat flea beetles, start with strong plants. Make sure to start with a good seedbed. Seedlings are particularly vulnerable. Start with older transplants that are healthy and about seven to eight inches tall. Floating row covers can be used to protect seedlings during development. Radishes and eggplants can be used as trap crops to deter feeding on preferred vegetables. Weeds can also be used as trap crops or deterrents; however, it is important to harvest the weeds before they start competing with the desired crop or before they start producing seed. Crop rotation has not been very effective for flea beetle control due to the high mobility of the beetles. Planting at a high seeding rate and thinning later can also help. If seedlings are well established during high densities of flea beetles, they can tolerate more damage. After crop harvest, plow or rototill these areas to remove overwintering adult beetles.

Several beneficial insects and other relatives occur naturally where flea beetles are present and can help reduce populations of the beetles. They can parasitize or feed on flea beetle adults or larvae. Parasitoid wasps in the genus *Microctonus* and nematodes in the genus *Howardula* are known to parasitize several species of flea beetles; however, levels of parasitism are generally low. Generalist predators (beneficial insects that feed on a variety of prey), such as lacewings, soft-winged flower beetles, big-eyed bugs, and field crickets will feed on flea beetles. Birds are also known to prey on them.

CHEMICAL CONTROL OPTIONS

Due to the high mobility of flea beetles, chemical control can be challenging. Chemical control is often necessary with crops that have edible heads, such as broccoli and cauliflower. Insecticides with a longer persistence or residual will work best in most situations.

Some insecticides can act as a barrier or deterrent. For example, kaolin clay acts as a physical barrier to flea beetle feeding. Diatomaceous Earth can also be used in a similar manner.

Organic options include those with the active ingredients pyrethrin, spinosad, horticultural oil, and neem oil/azadirachtin. Other insecticides include those with the fungal active ingredient *Beauveria bassiana* and the active ingredients permethrin, gamma-cyhalothrin, zeta-cypermethrin, and acetamiprid. Read and follow the label for any product used.

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