

Are All Flea Beetles the Same?

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“FLEA BEETLE” is a common name describing many species of beetles that use their enlarged hind legs to jump quickly when disturbed. The adults feed on the leaves of their host plants. Heavily fed-on leaves have a shot-hole appearance. The larvae (wormlike immature stage) usually feed on the roots of the same host plants as adults.

Common flea beetles that occur in North Dakota include the crucifer flea beetle (*Phyllotreta cruciferae*) and the leafy spurge flea beetles (*Aphthona* species). The crucifer flea beetle is a non-native insect pest that accidentally was introduced into North America during the 1920s. *Phyllotreta cruciferae* now can be found across southern Canada and the northern Great Plains states of the United States. The leafy spurge flea beetles are non-native biological control agents and were introduced for spurge control beginning in the mid-1980s. These biological control agents have been released in the south-central provinces of Canada and in the Upper Great Plains and Midwest states of the United States. Although *P. cruciferae* and *Aphthona* species are both known as flea beetles and do look similar, they differ in their description, life cycle and preference of host plants.



Crucifer Flea Beetle Versus Leafy Spurge Flea Beetles



Flea beetles have enlarged hind legs that they use to jump quickly when disturbed.

Crucifer flea beetle is an exotic insect pest.

Leafy spurge flea beetle species are introduced biological control agents.

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Crucifer Flea Beetle



Figure 1. Crucifer flea beetle

Overwintered adults feed on seedling cruciferous host plants. Summer adults feed on the pods of canola, mustard and cruciferous weeds.



Figure 2. Crucifer flea beetle feeding injury

Description

The adult is a small (about 1/32 to 1/8 inch), oval-shaped, bluish-black beetle with numerous dimples on the wing covers (Figure 1). The whitish larva is wormlike and approximately 1/8-inch in size, with tiny legs and a brown head.

Life Cycle

The crucifer flea beetle has one generation per year. Adult flea beetles overwinter in leaf litter of shelterbelts and grassy areas. They emerge from the overwintering sites during early spring as temperatures reach up to 57 F.

Volunteer canola and wild mustard are usually the first available host plants, with the beetles moving into the new canola fields as the crop emerges. Overwintered adults are usually active in the fields until late June, feeding on the foliage and depositing their eggs in the soil. The larvae can be found in the root zone of host plants during June and July. The pupal stage occurs from early to mid-July. The new generation, or summer adults, are present from late July to early September. They can be found feeding on the pods of canola, mustard, and cruciferous weeds. The summer generation will move to overwintering sites in early fall.

Host Plants

The crucifer flea beetle is an economic pest of oilseed *Brassica* (canola) and has a narrow host range restricted to plants in these families:

Capparidaceae – clammyweed and spider plant; **Tropaeolaceae** – nasturtium; **Limnanthaceae** – meadow-foam; **Cruciferae** – candytuft, cow-cress, poor-mans pepper, shepherds-purse, radish, charlock, turnip, cabbage, cauliflower, broccoli, hedge-mustard, common wintercress and honesty.

The crucifer flea beetle is known to be attracted to mustard oils. Mustard oils are common components among the plants selected by the crucifer beetle, suggesting that these compounds are the basis for host plant selection by this flea beetle species.

Feeding Injury

The overwintered adults cause the injury to their host plants. In the spring, they feed on the seedlings, producing pits in the tissue of the cotyledons and first true leaves. As the leaf tissue dies around the pits, the cotyledons and leaves appear shot-holed (Figure 2). Plant stand and plant growth can be reduced and maturity delayed when the crucifer flea beetle feeds on the seedling stage of its host plants. The larvae feed on secondary roots of host plants but this feeding has a negligible effect on plant vigor or yield. After “mid-July, summer adults feed on the developing pods or seeds (Figure 3). The host plant can have poor seed fill, premature pod drying, shriveled seed, or pod shattering from these infestations.



Figure 3. Adult crucifer flea beetles feeding on mature stems and pods of canola.

Leafy Spurge Flea Beetle

Six *Aphthona* flea beetle species were released in North Dakota for biological control of leafy spurge. Of these six species, the black flea beetle, *A. lacertosa* (Figure 4), and the brown flea beetle, *A. nigriscutis* (Figure 5), are the two species that have been the most successful and most commonly are redistributed to areas infested with leafy spurge. The first release of *A. lacertosa* in North Dakota was in 1988 and *A. nigriscutis* first was released in 1989. These two species have reduced leafy spurge to a nonweed problem in some areas of North Dakota.

Description

Aphthona flea beetles appear shiny or “polished” rather than being “dimpled” as in the economically important crucifer flea beetle, and they are approximately 0.10 inches long. The brown flea beetle, *A. nigriscutis*, has a clearly visible dark brown to black triangular mark directly below the thorax and between each wing cover (Figure 5). The black flea beetle, *Aphthona lacertosa*, is actually metallic blue and the enlarged segment of the hindlegs is yellow to brown (Figures 4 and 6).

Life Cycle

The leafy spurge flea beetles have one generation per year. However, they overwinter as third instar larvae (Figure 7) in the soil near the spurge roots. The larvae resume feeding on the spurge roots as the soil temperature exceeds 45 F in April and May. Root feeding continues into late May and early June, at which time they enter the pupal stage. The adults emerge from the soil during late spring into early summer and feed on the spurge vegetation and lay eggs in the cracks of the soil near the base of the leafy spurge stems. *Aphthona lacertosa* and *A. nigriscutis* adults live for about 1½ months in hot and dry conditions, and up to two months in cooler, wetter

conditions. The newly emerged larvae tunnel into the soil searching for the leafy spurge fibrous roots (feeder roots) near the soil surface. Second and third instar larvae (Figure 6) feed on the larger roots and root buds. The third instar larvae move deeper into the soil to overwinter as the soil temperature falls below 45 F.

Host Plants

Both leafy spurge flea beetles feed **exclusively** on plants in the family Euphorbiaceae (spurges). Variation in plant structure and habitat of the spurge species recorded as hosts suggest that secondary compounds, possibly latex, are important in this strong relationship between spurges and their flea beetles. Before releasing the *Aphthona* flea beetles into the United States, host specificity tests were conducted using several economic plants including canola, beet, corn, potato, sweet potato, carrot, rhubarb, and a perennial herb. None of these crops serve as hosts for the *Aphthona* species released into the United States.

Feeding Injury

The adult spurge flea beetles feed on the foliage of leafy spurge (Figure 8). However, it is the feeding by the larvae on the root system that causes the greatest damage to spurge and results in stand reduction. First instar larvae feed on the fine feeder roots, which reduces water and nutrient uptake. Second and third instar larvae reduce the energy storage tissue of the root crown by feeding on the larger roots. In addition, the plant becomes more susceptible to herbicides and infection from soil-borne pathogens after the larvae have injured the root system.



Figure 4. *A. lacertosa*



Figure 5. *A. nigriscutis*

Aphthona lacertosa and *A. nigriscutis* have been the most successful against leafy spurge.

The leafy spurge flea beetle larvae overwinter in the soil near the spurge roots.



Figure 6. *A. lacertosa*



Figure 7. *Aphthona* flea beetle larva



Figure 8. Adult *Aphthona* on spurge foliage

	Crucifer Flea Beetle	Leafy Spurge Flea Beetle
Common & Scientific Name	Crucifer flea beetle (<i>Phyllotreta cruciferae</i>)	Leafy spurge flea beetles (<i>Aphthona</i> spp.)
Host Plants	Cruciferae – Genus <i>Brassica</i> Mustard, Canola	Leafy spurge
Host Plant Attraction	Mustard oils	Possibly secondary plant compounds (latex)
Life Cycle	One generation per year. Adults overwinter in grassy areas in shelterbelts, ditches and field margins.	One generation per year. Third instar larvae overwinter near the roots of spurge.
Damaging Stage	Overwintering adults on young seedlings	Larvae on the roots

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 Figure 8, Cover (*Aphthona lacertosa*) – USDA-APHIS-PPQ
 Cover (*Phyllotreta cruciferae*) – Lloyd Harris, Regina, SK, Canada

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