Managing Flea Beetles on Brassica Crops

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THIS FACT SHEET DESCRIBES HOW MARKET GARDENERS AND SMALL FARMERS CAN REDUCE FLEA BEETLE DAMAGE IN ASIAN GREENS AND OTHER BRASSICA CROPS.

WHAT CROPS ARE ATTACKED BY FLEA BEETLES?

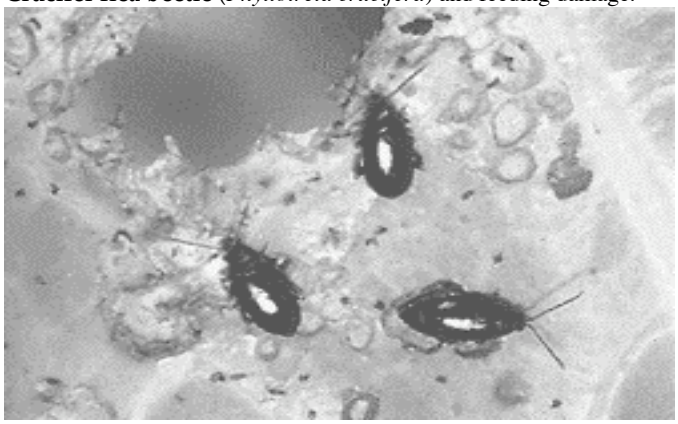
Flea beetles are small, oval shaped beetles that feed on leaves of plants. Flea beetles have large hind legs that enable them to jump large distances, like a flea. Many kinds of flea beetles exist, and each type feeds on a certain plant family. Crucifer and striped flea beetles feed on brassica crops such as cabbage, mustard, Chinese flowering broccoli, bok choi, or Chinese cabbage. They also feed on weeds that are in the same family, such as yellow rocket or wild mustard.

Other species of flea beetles attack eggplant, potato, and tomato, sweet corn, or other crops. These beetles look very similar to those that attack brassicas, but they do not feed on the same crops. This fact sheet will discuss flea beetles that feed on brassica crops, and how to protect these crops from damage.

Bok choi, one of the brassica crops attacked by cruicfer flea beetle.

The crucifer flea beetle is uniformly black in color, about 2 mm in length, and looks slightly metallic or shiny. The crucifer flea beetle is the most numerous on brassica crops in Massachusetts. The striped flea beetle can be distinguished from the crucifer flea beetle by two yellow stripes, one on each side of its back.

Crucifer flea beetle (*Phyllotreta crucifera*) and feeding damage.



Striped Flea Beetle
(*Phyllotreta striolatae*)

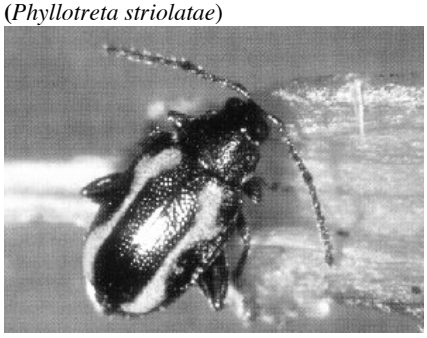
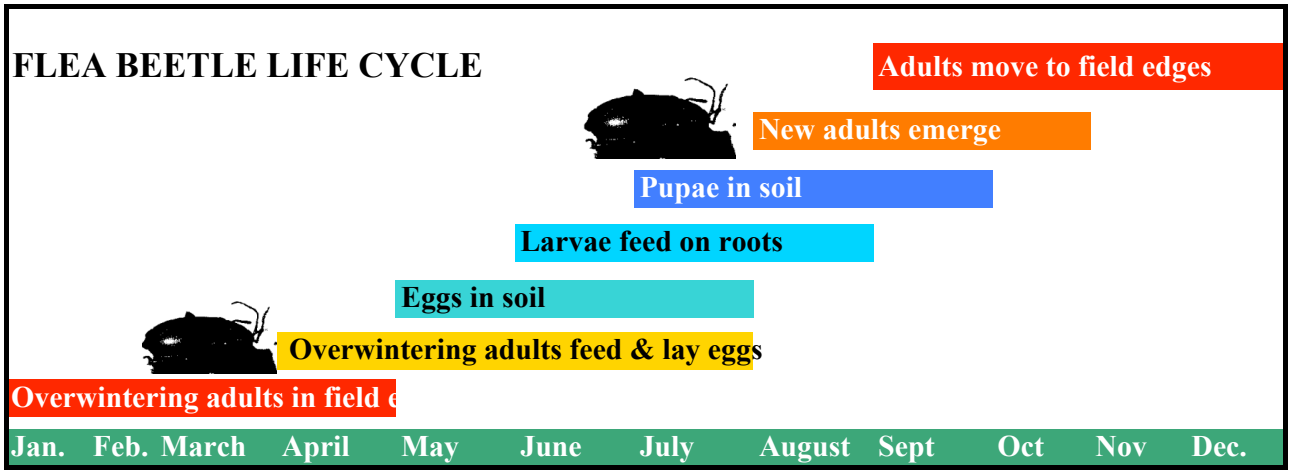


Photo courtesy of: Bulletin of Saskatchewan Ag &Food Agency.



FLEA BEETLE LIFE CYCLE

In the autumn, flea beetles move into the brushy areas beside fields. They spend the winter hiding in leaves near the soil. These adult beetles are known as "overwintering adults" because they start their life cycle in one summer, survive over the winter, and stay alive into the next summer. In early spring, they leave these protected areas and search for food. As the days become warm, they crawl, hop, or fly into nearby fields. When there are no crops planted, they feed on brassica weeds around field edges. Almost as soon as spring brassicas are planted, beetles will find the crop and cause damage. They use many sensory cues (odors, taste, vision) to locate their host plants, and are able to find even tiny new brassica seedlings in the middle of a large field. The most critical period to protect the crop is during May and June.

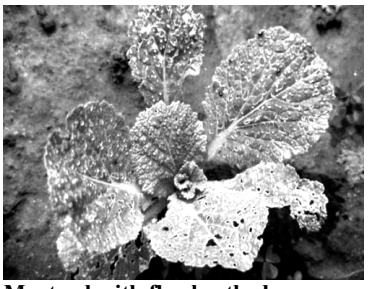
Beginning in May, the adult flea beetles mate, and females lay eggs at the roots of the plant. Once the eggs hatch, the larvae feed on the roots of the host, eventually entering into a pupal stage. Towards the end of July, the new generation of adult beetles begins to emerge from the soil. These beetles feed on late-season brassicas, though not usually as heavily as in the early season. In late August, flea beetles begin moving towards field edges for the winter.

Farmers who plant brassicas all season long may have flea beetles present for most of the season. One way to avoid flea beetles is to plant after the overwintering beetles have died, around the end of July. However, this is not practical for growers who want to sell brassicas all season long.

Crop rotation is also an effective way to reduce beetle damage. Because beetles overwinter near their late-season host crop, moving the spring crop to a field where no brassicas were grown in the previous season forces beetles to disperse and search a long distance to find the new crop. This is only effective if the new field is free of brassica weeds and is well- isolated from previous brassica fields.

FLEA BEETLE DAMAGE

Flea beetle adults feed on the surface of leaves and stems, resulting in numerous small holes over the surface of the leaf. Holes may get larger as the leaf grows. Intense feeding damage can kill plants, especially young seedlings. Even when plants do not die, the damage is often enough to reduce yield. Waxy crops like cabbage tend to be eaten mostly at the leaf edges. With non-waxy leaves like bok choi and mustard, flea beetles make holes across the whole leaf. For leafy greens, many markets will not accept greens with even slightly shot-holed appearance.



Mustard with flea beetle damage.

Flea beetles prefer to feed on some types of brassicas more than others, and these crops may have more damage. For example, mustard or Chinese cabbage may attacked more than kale or heading cabbage. Younger seedlings tend to be eaten more than older plants. Healthy, well-fertilized plants growing in good soil with adequate water may be attacked less than plants that are wilted, poorly fed, or growing in compacted soil.

At the University of Massachusetts, researchers are working with growers to test trap crops as a potential method of reducing harm to the main crop. A favorite crop, planted in a border around a less preferred crop, may keep the beetles from feeding on the main crop.

PROTECTING THE CROP WITH ROW COVERS.

One of the best ways to protect brassica crops from flea beetles is to place a floating row cover (also called spun-bonded row cover) over the bed or row. Row covers allow light and water to reach the crop but keep insects out. The cover can be placed directly over the crop ('floating', or lifted up as the crop grows) or on wire hoops that hold it above the crop. Many growers run a string across the tops of the hoops, to prevent sagging and reduce tearing on friction spots.

Row covers come in a wide range of widths. Narrow widths are just wide enough to cover one row (5-6 feet) while wider widths cover several rows or beds (15, 25, 35 or 65 feet). They also come in different weights. Lightweight row covers (0.3-0.6- oz. per square yard) keep out insects and are less expensive, but are more easily ripped and damaged by handling, animals, or wind. Heavier row covers (0. 9 to 1.25 oz/sq yd) are more expensive but do not tear easily, so they last longer and can be used for several years. Handle all row covers carefully and store them inside, out of sunlight, when not in use.

Place row cover over the crop as soon as it is seeded or transplanted. Brassica seeds germinate quickly (in 1-5 days). Do not wait until the crop is up and the beetles have found the crop. Make sure the edges are sealed so that the flea beetles cannot crawl inside. Some growers will seal them with soil while others will use weights (e.g. bags of soil) or stakes. Make sure the edges will stay sealed even in windy conditions. Covers can be removed on dry days to weed the crop but should be replaced as soon as possible.

Row cover over early broccoli. There are no hoops here; the crop is pushing up the cover.

Plants growing under covers are also protected from wind and other insects, and grow faster because the temperatures are warmer during both day and night. Greens may be longer and more tender than crops grown in the open, and can be harvested sooner. Some brasssica crops can become unmarketable if left too long under row cover due to misshapen appearance. See the fact sheet, *Using Row Covers*, for more details.

SPRAYING INSECTICIDES TO KILL BEETLES

Insecticides that kill flea beetles can protect the crop from damage. Beetles are killed by coming in contact with the spray or with treated leaves, or by feeding on treated leaves. Consult the latest edition of the *New England Vegetable Management Guide* for a list of insecticides that are labeled for flea beetle management in brasssica. Each insecticide has a label which describes how and when it can be used. If the insect or the crop is not listed on the label, then it may not be used in that case. The *Guide* also describes pesticide safety procedures. The *Guide* can be obtained from the UMass Extension bookstore (413-545-2717).

One of the more common and efficacious insecticides for flea beetle management in brasssicas is carbaryl (trade name, Sevin). Sevin is a general use pesticide, which means that it can be used by farmers and market-gardeners who are not certified pesticide applicators. Carbaryl (Sevin) is readily available at farm and garden supply stores. It is toxic to people and to bees and must be used carefully. If used correctly it kills the insect without harming the people who apply the spray or who pick and eat the crop. Using it incorrectly is a violation of the law, and a danger to the people who work in and eat the crop. It is the responsibility of farmer to protect farm workers and anyone who enters the field from pesticide exposure.

Below is a list of things to keep in mind when using Sevin. Many of these apply to any pesticide use.

What kind of Sevin to buy. We recommend buying a concentrated, liquid form of Sevin that contains 22.5% carbaryl. Look on the label on the bottle to find this concentration. A widely available brand is *Garden Tech 'Sevin Bug Killer'*, which comes in a 32 oz. bottle and contains 22.5% carbaryl.

Protect yourself from exposure. Wear protective gear when mixing and spraying, including rubber gloves, shoes, long pants, a long-sleeved shirt. When mixing, also use a rubber apron to protect against spills. Remove these clothes after spraying is done, and wash separately from the rest of the family laundry.

Calibrate your sprayer and mix pesticide carefully. Before you start mixing up the chemicals, you need to figure out how much to mix. First, practice spraying with plain water. This will determine how much water you need to cover a certain area. Once you know how much water you need to spray that area, you will be able to tell how much pesticide to mix for the real spray.

Here is an example: Put one gallon of water (four quarts) in the spray tank. Spray the plants you want to protect. Measure how much is left, and subtract to calculate the amount you used. For example, if you covered four rows with one gallon (4 quarts) then you know that one quart will spray one row, 2 quarts will spray two rows, etc.
After you determine how much water you will use to cover the leaves of the plants, then you can determine how much chemical to mix in. With 22.5 % concentrated Sevin, the label states that the rate to use against flea beetles is _ to 1 _ oz. per gallon of water. We suggest using 1 oz. (fluid ounce) of Sevin per gallon of water.
If one gallon covers one row and you want to spray 4 rows, then mix up 1 oz. of chemical into 1 gallon of water. If you only wanted to spray one row, then you should only mix up _ oz and _ gallon, or 1 quart.

When to spray. Do not spray if there is a breeze that will carry the spray onto nearby crops or people –wait until it is calm. Do not spray just before a rain – wait until after the crop dries. The best times to spray are early evening or early morning before a sunny day when beetles will be active.

Post the area. Put warning signs at the edges of your crop to let others know that you have sprayed. No one should go into the area for 12 hours after spraying Sevin. Especially children!!

Check to see if more sprays are needed. Check the crop two or three days after you have sprayed. Look for new feeding damage and active flea beetles. Beetles move in and out of the field it may be necessary to spray more than once as the crop grows. However, the label states that you should not spray more often once per week.

Wait before harvesting the crop. The label of every pesticide tells how long you must wait after spraying before you harvest the crop. This time period, called the "days to harvest interval", is needed to be sure there is no chemical left on the crop when it is eaten. **With Sevin, leafy crops may not be harvested or eaten for 14 days after you have sprayed.** Harvesting sooner may cause customers or your family to consume harmful residues of the pesticide.

Clean-up. Rinse your sprayer after use in a special area set aside for rinsing and mixing, where the water will not contaminate fields, people or shelters. The best way to dispose of the rinse water is to spray it on the ground in the crop area where you just sprayed. Store the sprayer and the insecticide in a locked shed, closet or trunk where children will not be able to get to it.

Do not kill bees. Sevin is very toxic to bees. Bees are very important for the pollination of crops such as cucumbers and melons. Do not spray any crops that are blooming or where bees may be foraging.

FLEA BEETLE CONTROL FOR ORGANIC FARMERS.

Organic growers must follow certain rules about how to grow their crops and what pesticides and fertilizers they may or may not use. These rules can be found in organic certification standards. Sevin may not be used by organic growers. Organic growers may use the following insecticides against flea beetle: pyrethrin (Pyganic Crop Protectant), neem (Ecozin or Agroneem), rotenone, or Hot pepper wax. These insecticides may not be effective enough to prevent damage. We recommend that farmers who want to control this pest by organic methods use row cover, plant later in the summer, or rotate their crop to a field where brassica crops or weeds have not been growing for the past several years. In any case, by far the most effective control of flea beetles (conventional or organic) is achieved by using row cover.

This information is for educational purposes. The recommendations contained here are based on the best available knowledge at the time of printing. Any reference to commercial products or trade names is for information only, and no endorsement or approval is intended. Always read the label before using any pesticide. The label is the legal document for product use. Disregard any information in this fact sheet if it is in conflict with the label.

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