Colorado Potato Beetle in the Home Garden

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Damage
The primary damage of Colorado potato beetle is leaf feeding on potato, eggplant, and tomato, and occasionally on pepper, tobacco, and other plants in the nightshade family. Young fruits can also be eaten if the host is eggplant or tomato. Feeding damage is done by both larvae and adults. Leaf feeding has the greatest effect on potato tuber growth if it occurs within two weeks of peak flowering; leaf feeding during the last few weeks before harvest or very early in the growth of the crop has little effect on tuber yield.

Classification
The scientific name of the Colorado potato beetle is *Leptinotarsa decemlineata* (Say). It is a member of Order Coleoptera, Family Chrysomelidae.

Identification
The adult Colorado potato beetle is 10 mm (3/8 inch) long, with its rounded outer wings forming a hard “shell” marked with black and yellowish-white stripes. The head is tannish-orange with black markings and the beetle has six brownish-orange legs. The eggs are yellowish-orange, football-shaped, and found in clumps of 20 to 40 on the underside of leaves. The larva is the immature form, sometimes called a “soft-shell” beetle. The larva has a soft, reddish-pink body with two rows of black spots along each side, six black legs, a black head, and is 3 to 13 mm (1/8 to 1/2 inch) long. The pupa is yellow and is found in a motionless condition in a round cell in the soil.

The Colorado potato beetle is sometimes confused with a similar species, the false potato beetle (*Leptinotarsa juncta*), which feeds on horsenettle. Both species have dark stripes on a pale background on their wing covers. In the Colorado potato beetle, the background color is a uniform pale yellow, while in the false potato beetle, the background color is pale yellow between some stripes and light brown between other stripes. Both species have a row of tiny punctures along the stripes on the wing covers; in the Colorado potato beetle the rows of punctures are irregular, while in the false potato beetle the rows are straight. The larvae of false potato beetle have only one row of spots down each side.
Life Cycle and Behavior

The Colorado potato beetle lives in Ohio year-round. Adult beetles overwinter in soil or under litter in fields, gardens, or fencerows, and they begin to emerge from these locations in May. All of the beetles in an area may emerge over a short period of time, but if weather conditions are dry or cool, beetles can emerge over a prolonged period. After they emerge from the soil, beetles walk in search of suitable host plants where they feed and lay eggs on leaves. If they do not find suitable food while walking, they will fly in search of food. Eggs hatch into larvae in 4 to 15 days, depending on temperature.

Larvae begin to feed on leaves during June, often in exposed locations on the upper part of the plant. Early-season infestations are sometimes not evenly distributed within a garden but are clumped on one side of the planting or on a small number of plants. After 2 to 4 weeks of feeding, larvae are fully grown and they drop from plants and dig into the soil where they go through their pupal stage. After 5 to 10 days in the soil, the pupae turn into adult beetles and crawl above ground. The new adults feed on leaves, then mate and lay eggs. The second brood of larvae is usually active in July and August. There are usually two broods of larvae per year on potato in Ohio, although there can be one brood in cooler than normal years or three broods in warmer than normal years. On tomato, it is common to have only one brood.

Management

Because of resistance problems, chemicals alone are no longer adequate for control of Colorado potato beetle. Infestations should be prevented by using appropriate cultural practices. If insecticide sprays are needed, careful thought should be given to the selection of the chemical and the spray timing.

Adjusted Planting Date

Potatoes planted in early May are likely to be infested by potato beetles at the worst possible time, which is during flowering. Gardeners have an opportunity to avoid beetle problems by planting all of their potatoes either a month earlier or a month later than early May.

If potatoes are planted very early (in early April) so that plants bloom before June, beetle damage will occur too late to affect yield. Use an early-maturing variety and aim for an early-July harvest. Although the early-planted potatoes can tolerate much leaf feeding, the gardener must learn to tolerate the presence of infested plants. If the gardener can’t stand the sight of infested plants, it would be better to try the late-planting strategy.

If potatoes are planted late (in mid-June), most beetles will have left the area before plants emerge. Again, use an early-maturing variety so that the crop will mature before October.

Cultural Controls

Promote rapid emergence and growth of potatoes by selecting a well-adapted cultivar (variety) for the site. Larger plants are better able to tolerate defoliation than smaller plants.

Use early-maturing cultivars and harvest as soon as the crop is mature. This reduces the food source for late-season beetles and can weaken them for their overwintering phase.

Physical Control

Hand picking can effectively control the Colorado potato beetle in small plantings. Inspect plants once or twice per week, remove all larvae and adult beetles, drop them into a container of soapy water, then dispose. Dislodge beetles by lightly beating plants with a broom; hold a bucket or snow shovel under plants to catch the dislodged beetles. Eggs can be crushed by hand. A vacuum cleaner can be used to remove beetles from young plants.

Lightweight row covers can be placed over plants as a barrier to prevent adult beetles from colonizing the plants.

Biological Control by Natural Enemies

Several natural enemies of the Colorado potato beetle can help reduce the pest population, but none has yet been found that alone can control this pest. Potato beetle eggs and larvae are preyed on by two kinds of stink bugs: the spined soldier bug and the two-spotted stink bug. Lady beetles (ladybugs) feed on eggs of potato beetles, and a parasitic fly and a fungus can attack potato beetles. Lady beetles also feed on pollen so they can be attracted to gardens with many flowering plants. Natural enemies can be protected by avoiding use of harsh insecticides, and using “soft”
insecticides instead; for example, spinosad is toxic to Colorado potato beetle larvae but not highly toxic to the beneficial insects mentioned above.

**Chemical Control**

Small larvae are most easily killed by insecticides, large larvae are more difficult to kill, and adults are hardest to kill. Insecticides are thus likely to be more effective if applied when most of the beetle population is in the early larval stage.

**How to Decide on the Need for Chemical Control**

Potato plants should be scouted (inspected) on a weekly basis. Estimate the percentage of defoliation. Randomly select several plants and count the number of egg masses, small larvae (< 5 mm [< 3/16 inch]), large larvae (> 5 mm [> 3/16 inch]), and adults. Divide by the number of plants inspected to calculate the average number per plant.

Treatment is suggested when there is more than 10% defoliation, or when the number of insects found exceeds a threshold number. A general threshold for Colorado potato beetle is 4 small larvae per vine, or 1.5 large larvae per vine, or 0.5 adults per vine.

If the infestation is localized in one area of the garden, then spot treatment of that area can be done rather than a treatment to the entire potato patch.

**Products Available for Chemical Control**

The Colorado potato beetle can develop resistance to insecticides. In areas of intensive potato production where insecticides have been heavily used, beetles are resistant to nearly all insecticides. Because resistance to one chemical is often followed by resistance to related chemicals, it is best to alternate chemical classes when you make applications; you would use one class during May and June for first-brood beetles, then switch to a different class during July and August for second-brood beetles. Six major classes of insecticides are listed below. Be sure to follow directions on the label of any product.

1. **spinosad**: very effective on larvae, not effective on adults.
2. **pyrethrins (pyrethrum)**: This broad-spectrum insecticide is derived from dried chrysanthemum flowers. It is most effective at cool temperatures and less effective as temperature increases. It is most effective in products that have piperonyl butoxide (PBO) added as a synergist, but it is fairly effective in products that have canola oil added instead of the PBO.
3. **rotenone**: Rotenone is a broad-spectrum insecticide that is derived from the roots of a tropical plant. It is sold alone or in a mixture with pyrethrins.
4. **pyrethroids**: esfenvalerate (Bug-B-Gon Max Garden & Landscape Insect Killer), permethrin (Eight).
5. **carbamates**: carbaryl (Sevin) has been widely used and is no longer effective for potato beetle control at many locations due to resistance.
6. **organochlorines**: endosulfan (Thiodan).

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This publication contains pesticide recommendations that are subject to change at any time. These recommendations are provided only as a guide. It is always the pesticide applicator’s responsibility, by law, to read and follow all current label directions for the specific pesticide being used. Due to constantly changing labels and product registration, some of the recommendations given in this writing may no longer be legal by the time you read them. If any information in these recommendations disagrees with the label, the recommendation must be disregarded. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The author, The Ohio State University, and Ohio State University Extension assume no liability resulting from the use of these recommendations.

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