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Colorado Potato Beetles in Home Gardens

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The Colorado potato beetle, *Leptinotarsa decemlineata* (Say), is a major potato pest throughout North America. It was first recognized as a potato pest in 1859 in Colorado when the beetle switched from its normal host, buffalo bur, a relative of potato, to cultivated potatoes brought into the region by early settlers. Once beetles began feeding and reproducing on cultivated potatoes, they were able to migrate eastward feeding on potatoes grown on farms and in gardens throughout the Great Plains and Ohio River valley. On average, the Colorado potato beetle expanded its range eastward approximately 85 miles per year, reaching the East Coast by 1874.

Identification

Adult Colorado potato beetles are oval in shape and 3/8 inch long (Figure 1). They have a yellow-orange prothorax (the area behind the head) and yellowish white wing covers (elytra) with 10 narrow black stripes. Females lay clusters of bright yellowish orange oval eggs on the underside of leaves (Figure 2). When young larvae first hatch, they are brick red with black heads. Older larvae are pink to salmon colored with black heads (Figure 3). All larvae have two rows of dark spots on each side of their bodies.

Figure 1. Colorado potato beetle adult.

Life Cycle

Colorado potato beetle adults overwinter in potato fields, field margins, windbreaks, and gardens. They become active in the spring at about the same time potatoes emerge (sometime in May). Adults feed for a short time in the spring, and then begin to mate and lay clusters of 10-30 eggs on the undersides of leaves. Each female can lay up to 350 eggs during her adult life which can last several weeks.

Figure 2. Egg mass on underside of leaf.

Eggs begin to hatch within 2 weeks, depending upon temperatures. Larvae remain aggregated (in groups) near the egg mass when young but begin to move throughout the plant as they eat the leaves. Larvae can complete development in as little as 10 days if average temperatures are in the mid 80s F while it will take over a month if temperatures average near 60° F. The fourth instar larvae drop from the plant, burrow into the soil and pupate. In southern and central Minnesota there is generally a second generation. By midsummer, all stages of Colorado potato beetles, eggs, larvae and adults can be present in a potato field.

Damage

Both larvae and adults feed on the foliage of potatoes and, if left untreated, can completely defoliate plants. In addition to potato, they may also feed on eggplant, tomato, pepper, and other plants in the nightshade family (Solanaceae). Old larvae (*i.e.* the last or 4th larval instar) are responsible for as much as 75% of feeding damage. Potatoes can usually tolerate substantial defoliation, up to 30%, when they are in the vegetative stage, but they are much more sensitive to the effects of defoliation when tubers are beginning to bulk and then can only tolerate about 10% defoliation. Tuber bulking begins soon after flowering, making this time critical for beetle management.

Figure 3. Larvae and defoliation.

Management

Treatment of Colorado potato beetles in home gardens can be challenging, but not an impossible task. Insecticides available to home gardeners are largely ineffective because of widespread insecticide resistance of the Colorado potato beetle. However, using a combination of pest management tactics helps reduce Colorado potato beetle numbers.

Sanitation

If potatoes are not available when Colorado potato beetles first emerge in the spring, they will seek out alternate hosts, such as nightshade and ground cherry. Clean up these weeds near your garden to remove them as a possible food source.

Cultural

Planting an early maturing variety will allow you to escape much of the damage caused by adults emerging in midsummer. Check seed catalogs for varieties that mature in less than 80 days. Yields on early maturing varieties are not as large, and often these varieties do not store as well as the popular Russet Burbank potato.

Crop rotation is largely ineffective because the Colorado potato beetle can fly long distances when temperatures exceed 70°F. Growing potatoes only every other year may help reduce beetle populations if no potatoes are being grown within a radius of ¼ to ½ mile away and temperatures are not excessively warm.

Physical

Handpicking, especially in small gardens, can be effective. Drop adults and larvae in a pail filled with soapy water. Also remove or crush the yellowish orange eggs on the underside of leaves. New adult beetles can fly into gardens so be sure to check your potatoes regularly. Handpicking may be less practical in larger gardens.

Biological

There are few natural enemies of the Colorado potato beetle. Stink bugs and lady beetles will prey upon Colorado potato beetle eggs, and the fungus *Beauveria bassiana* will kill both larvae and adults. However, natural enemies will have little impact on overall Colorado potato beetle numbers.

Microbial

Bacillus thuringiensis var. *tenebrionis*, a naturally occurring bacterial disease, is an effective product (e.g. Colorado Potato Beetle Beater) available to home gardeners. *Bacillus thuringiensis* var. *tenebrionis* can control young Colorado potato beetle larvae (1st and 2nd instars) but does a progressively poorer job on larger larvae and adults. Colorado potato beetles have not developed resistance to this toxin as they have with general use insecticides. To be successful in managing Colorado potato beetles in home gardens, apply this product frequently (every few days) beginning when egg masses begin to hatch. Waiting to apply this material when larvae are in the 4th instar results in poor control.

Insecticidal

Essentially all synthetic insecticides available to home gardeners for Colorado potato beetles, such as carbaryl and permethrin, are unlikely to provide adequate management due to problems of insecticide resistance. This is particularly true when home gardens are located near commercial potato fields. The use of synthetic insecticides is generally not suggested. An exception to this would be esfenvalerate. This is a relatively new synthetic insecticide and insecticide resistance is not as well established in Colorado potato beetles. However, anytime you use an insecticide and it does not seem to kill Colorado potato beetles, switch to a different active ingredient.

Pyrethrin can be effective but it has a short residual. Smaller larvae should be targeted to achieve the best results. Some Colorado potato beetles may have developed resistance to pyrethrins.

Azadirachtin (Neem), an insecticide derived from the Neem tree of Asia and Africa, may provide some management of Colorado potato beetles. Spinosad is also effective against Colorado potato beetle. This product is an aerobic fermentation product of the soil bacterium, *Saccharopolyspora spinosa*.

Colorado potato beetles are not resistant to azadirachtin or spinosad. These products are also 'soft' on natural enemies. However, azadirachtin breaks down rapidly and needs to be reapplied frequently. It also generally provides poorer control of large larvae and adults.

Below is a table listing common names of active ingredients. You can find the common name for a pesticide by examining the label and looking under *Active Ingredients*.

Common name	Residual*	Notes
esfenvalerate	long	contact (resistance could occur)
pyrethrins	short	contact (resistance could occur)
azadirachtin	short	contact
spinosad	medium	contact

**Long residual can persist as long as four weeks. Medium residual can persist as long as 10-14 days. Short residual is one day or less. However, length of residual activity may be shortened by various weather conditions, such as rainfall.*

Caution: Read all insecticide labels very carefully before buying and again before using to ensure proper application. It is especially important that the label specify recommended use on potatoes, or generally on vegetables. Also be sure to observe the number of days between pesticide application and when you can harvest potatoes. The label is the final authority on how you may legally use any pesticide.

Figures 1 and 2: Department of Entomology, University of Minnesota. Figure 3: Jeff Hahn.