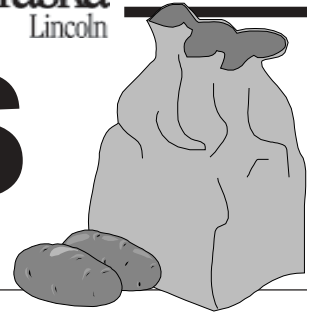


# POTATO EYES



Vol. 16, Issue 2, Summer 2004 • Alexander D. Pavlista, Ph.D., Extension Potato Specialist  
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## Grasshoppers

Grasshoppers comprise many species. They are not considered major pests in potato fields but when seasonal conditions are favorable, they may migrate into potato and can defoliate sections of a field.

### Description

Grasshoppers have large, strong, biting jaws. Their hind legs are strong and adapted to jumping. Their body is elongated and slightly cylindrical. It is partially sheathed by long, slender membranous wings topped with outer leathery wings. Their antennae are relatively short. There are five species that are responsible for most of the damage in North America: migratory, differential, two-striped, red-legged, and clear-winged grasshoppers.



Leaf feeding by young grasshoppers.

### Damage

Grasshoppers are migratory, able to move across a large distance. Their damage in potato is most severe in the central region of the continent, the Plains States and in the mountainous areas of the West. Their greatest damage is by chewing holes in foliage. Damage usually occurs for a short time toward the end of the growing season and there is only one life cycle per year. The outbreaks need to be very severe to cause economic damage in a field but damage can be severe enough along the field edge to cause yield reduction.

### Management

Young grasshoppers are controlled by soil-applied systemic insecticides used for other pests. Mid and late season treatment can be limited to the edges of field where grasshoppers are seen. Treatment is seldom required.



Defoliation by grasshoppers (Foliated rows were treated with imidacloprid.)

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# Variegated Cutworm

Cutworm is a general term referring to the larval stage of many night-flying miller (*Noctuid*) moths. Nationally the most economically important ones for potato are the variegated cutworm (*Peridroma saucia*), black cutworm (*Agrotis ipsilon*) and spotted cutworm (*Amathes c-nigrum*). They all have similar habits and appearance; therefore, variegated cutworm is used as the model.

## Description

Adults are called miller moths and are usually drab gray or brown but also can be somber yellow and tan.

Larvae are the cutworm which is the damaging stage. Cutworms are caterpillars that when disturbed curl their body into a tight 'C' appearance. They have a smooth skin and a wet or greasy texture; their body is plump. The variegated cutworm is grayish brown and lightly speckled with darker brown; it has a single row of pale yellow dots along each side of its body. The black cutworm is greasy gray or brown with faint lighter stripes and granular appearance. The spotted cutworm has a dark stripe along each side of its body and several pairs of triangular-shaped black dashes at the rear of its back. Full grown cutworms are two inches long.

Eggs are small and hemispherical laid under debris, in the soil or on leaves and stem depending on geography.

Pupae are tiny and form in the soil.

## Life Cycle

Developing larvae, cutworms, and pupae overwinter in the soil especially from previously grassy areas. Cutworms emerge in the spring. Mature cutworms return into the soil where they will dig a small chamber in which they pupate. Adult moths emerge from overwintered pupae or early-season pupae. Causing no damage, they fly around at night (attracted to electric lights), mate and lay eggs late in the afternoon or at night. Some species lay a single egg or small groups of eggs while others like the variegated cutworm lay closely-packed rows of over 600 eggs. The incubation period ranges from two to 14 days depending on species and temperature. The eggs hatch as cutworms. All cutworms have the same general life cycle; the length of stages varies



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somewhat. All stages of the variegated cutworm develop rapidly and three or four generations per season are possible. Others may have only one generation per season.

## Damage

Initially, spring-emerged cutworms do slight damage by cutting into young stems while eating only a little bit. Unlike, armyworms, cutworms are loners; they do not travel in hordes and are not as prolific. Most cutworms only attack the stems of a few small, often weak, plants. However, the variegated cutworm and a few others will climb up the plant and eat leaves. Feeding is only at night and cooler times of the day.

During the day, they hide in soil cracks, or under debris and clods at the soil surface. Their leaf feeding appears as ragged holes or cut-outs in the leaflets. On rare occasions, cutworm feeding on an exposed tuber, leaving shallow holes, has been observed. Economic damage occurs only when there is a high population with intense feeding in the middle of the season during early to mid bulking when plants tolerate up to 10% defoliation.

Most foliar damage usually occurs late in the season after bulking when there is little if any effect. Since cabbage and other loopers and armyworms are seen during the day, they may be blamed for cutworm damage.

# Potato and Tuber Flea Beetles

## Variegated Cutworm

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### Management

Biological -- Grassland which will be rotated to potato, should be plowed in late summer or early fall thereby reducing the number of eggs deposited. Early fall plowing and clean cultivation will remove debris on which they feed. Cutworms will die of winter starvation or even cannibalism. Do not plant immediately after stubble, grass or sod. In general, cutworms are naturally controlled by parasitic wasps and tachnid flies, and are prone to various diseases.

Chemical -- Special chemical treatment for cutworms is discouraged. Soil-applied systemic insecticides used for other pests work well. Since their damage seldom appears until late in the season, it is not economical to treat.

### Quick Review

#### Appearance

- Adult - night-flying miller moths, usually gray or brown
- Larva - smooth-skinned caterpillars, cutworms, up to two inches

#### Life Cycle

- Overwinter as cutworms or pupa
- Up to four generations per season depending on species and climate

#### Damage

- Foliar feeding causing ragged holes usually late in season

#### Management

- Fall-plowing especially of grassland
- Insecticides used against other, more important, pests

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There are many small leaf feeding beetles called flea beetles because of their well-developed hind legs that allow them to jump like fleas. In potato, the principle flea beetles are in the genus *Epitrix* and are considered a minor pest. Of these the potato flea beetle (*E. subcritita*) and the tuber flea beetle (*E. tuberosa*) are the most economically important. They look very much alike and are hard to distinguish; however they are geographically separate. The potato flea beetle is found from mid-Nebraska east to Maine and along the Atlantic Coast south to the Carolinas. The tuber flea beetle is found from western Nebraska and Colorado west through the inter-mountain States to the Pacific Coast up through the Pacific Northwest.



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### Description

Adults have an oval body, and their color is shiny green to brown to black. Their hind legs are enlarged for jumping. They are about 1/16 inch long.

Eggs are white and oval. They are deposited in soil cracks near the surface and are not seen due to their very small size.

Larvae are elongated soft-bodied grubs about a quarter to a third inch long. Their body is whitish with a yellowish or light brown head. They have six short legs.

Pupae are rarely seen as they form several inches in the soil.

### Life Cycle

Adult flea beetles overwinter near where they emerged. They will overwinter in plant debris and weed hosts. The potato and tuber flea beetles usually will burrow into the ground a few inches but may go as deep as a foot and a half. In light soils, many of the adults will go into a hibernation period below normal plowing depth. Adults emerge when the temperature reaches 50°F, between May to early June in the North and earlier in the South, and begin feeding on weeds or Solanaceous bedding plants such as tomato. When potato plants have emerged, many will fly into the potato field and the adults begin feeding on the foliage. Adults mate and eggs are deposited on the soil surface and in its cracks near potato plants. After about 10 days, larvae hatch. The early generations' larvae feed on roots and underground stems, and sometimes on growing tubers. Mature larvae leave the potato structure and dig a small smooth earthen chamber in which they pupate. Pupation is short;

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# Potato and Tuber Flea Beetles

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newly-formed adults are soft-shelled and crawl to the surface where their shell hardens and darkens. The cycle normally takes four to six weeks but can be delayed to nine weeks under unfavorable conditions. Normally, there are one to four generations per season depending on locale.

## **Damage**

Damage by flea beetles is of two major types, on foliage and on tubers. The principle damage by the



potato flea beetle is foliar while the economic damage by the tuber flea beetle is to the tubers to be harvested.

Damage to foliage is from feeding adults of all flea beetles and are small round holes scattered in the leaf blade giving them a “shot

hole” or sieve-like appearance. A slight chlorosis, yellowing, may occur around the holes. This injury is not economic to treat for and rarely defoliation occurs. Usually only the potato flea beetle, found in the eastern half of North America, will occasionally cause enough foliar injury to be economically important. When the rare, severe infestation occurs, plants can defoliate, and tubers can remain small and become deformed.

The last generation of larvae cause the most economic damage by feeding on mature tubers. Their feeding results in tubers with narrow, straight tunnels about 1/32 inch wide along the perimeter of the tuber. The tunnels are usually shallow but can extend as much as 1/2 inch deep. The tuber flea beetle, found in the western half of the continent, is especially damaging as they scar the tuber badly and also drill deeper. So, besides holes, small raised bumps also may appear on the tuber surface. Extensive tuber

feeding can make the tuber unmarketable for the fresh and processing markets but have no effect on seed tuber vigor. However, there also are reports that the tuber holes can act as entryways for pathogenic bacteria such as soft rot and fungi such as dry rot making the tubers unsuitable for seed as well.

## **Management**

Flea beetle infestation are sporadic and unpredictable; economic thresholds are not known. Since flea beetles tend to stay around potato plants, crop rotation may play a key role. Controlling weeds around and in potato fields is a key part of holding down flea beetle populations. Common, soil-applied systemic insecticides work well in controlling adults. Foliar products used for other pests such as Colorado potato beetle and green peach aphid work well against flea beetle adults. Treatment for larvae are not available.

## **Quick Review**

### Appearance

- Adult - oval; shiny green to black; large hind legs; 1/16 inch
- Larvae - thread-like grubs; whitish; up to 1/3 inch

### Life Cycle

- Overwinters as adults in debris or hibernate
- One to four generations per season
- Generation is 4 to 6 weeks up to 9 weeks

### Damage

- Foliage has shot-hole appearance
- Tubers have narrow tunnels and possibly scars

### Management

- Crop rotation
- Weed control
- Systemic soil insecticides at planting
- Foliar insecticides when used for other pests



The Nebraska Potato Eyes is on the WWW at:  
[www.panhandle.unl.edu/peyes.htm](http://www.panhandle.unl.edu/peyes.htm)

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