

## Bean Leaf Beetle Biology and Management in Snap Beans

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**Order:** Coleoptera

**Family:** Chrysomelidae

**Species:** *Cerotoma trifurcata* (Forster)

**Size:** Adults are about 1/4 inch (64 mm) long.

**Description:** Adults range in color from yellow to a dull red with variable numbers of black spots (Fig. 1). Although some have no spots, most will have four black spots down the center of the back with marginal spots or stripes on the edge of the elytra. The distinguishing characteristic is that all have a distinct black triangle behind the prothorax. Eggs are reddish orange ovals about 3/100 inch (0.8 mm) long and have tapered ends. Larvae are white, cylindrical grubs with a black head and anal plate. They have well-developed thoracic legs as well as anal prolegs. The pupae are white and resemble the adult in size and shape.

**Habitat:** Snap beans, soybeans, and other legumes. Eggs, larvae, and pupae of the bean leaf beetle occur in the soil and are typically not encountered.

**Distribution:** This beetle is native to the United States and is predominantly found east of the Rocky Mountains. It is abundant in the soybean producing areas of Virginia.

**Life Cycle:** There are typically three generations per season in Virginia. Bean leaf beetles overwinter as adults, usually in woodlands surrounding fields, and become active in the spring. The milder the winter, the earlier the bean leaf beetles emerge from their overwintering habitats. The adult bean leaf beetle usually appears early in the growing season coinciding with spring snap bean planting. Adults feed and mate on snap beans, soybeans, and other legumes. The female lays 250 to 350 eggs (per season) usually found in clumps of 12 in the soil near host plants. The larvae emerge from



Fig. 1. Bean leaf beetle adults. Color patterns can range from yellow to red with no spots or multiple spots as shown. The black triangular plate behind the prothorax is a distinctive feature (Photos by M. Cassell).

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Produced by Communications and Marketing, College of Agriculture and Life Sciences,  
Virginia Polytechnic Institute and State University, 2009

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eggs in five to seven days at 77°F and begin feeding on the roots and nodules of the host plant. The larval stage consists of three instars with the mean duration of this life stage lasting 17 days at 77°F. The larval stage duration may be longer or shorter depending on soil temperature. Once the larvae reach maturity they build an earthen cell in the soil in which to pupate. Adults emerge from the soil within a week and start to feed on legume leaves and pods.

**Type of Damage:** The foliar damage inflicted on young snap bean plants can be substantial. The mean consumption of foliage per adult can reach 2 cm<sup>2</sup> per day. During this early feeding, more than 50 percent of the snap bean foliage can be consumed. Unlike soybeans, which typically can tolerate and compensate for early-season defoliation, foliar damage to snap beans can result in significant stand or yield loss. Bean leaf beetle feeding produces distinctive round holes inside the leaf margin (Fig. 2). Larval feeding on snap bean roots and nodules may cause a girdle around the base of the plant which can stunt growth. Later in the growing season, pod feeding by adults can be observed. This feeding causes cosmetic damage resulting in unmarketable snap bean pods, and also provides a point of entry for secondary infections.

## Management

**Sampling/Scouting:** Currently, there is no well-defined economic threshold established for bean leaf beetle in snap beans. Controlling first generation adults early in the growing season can help reduce the size of the successive second and third generations in Virginia. Many growers treat early for this pest based on the presence of adults and leaf damage. Although sweep-net sampling is an effective way to collect bean leaf beetles, usually visual observation of adults and leaf feeding injury on plants is sufficient for detecting the presence of this pest.

**Biological Control:** Bean leaf beetle has few known natural enemies. There are a few tachinid fly parasitoids of the adults, but they are generally not effective in reducing population levels.

**Chemical Control:** Foliar applications of pyrethroid insecticides are generally effective in controlling bean leaf beetle. Sometimes multiple sprays are needed for season-long control. In addition, neonicotinoid insecticide seed treatments have been determined to be effective in minimizing first generation adults.



Fig. 2. Typical bean leaf beetle foliar feeding injury on snap bean (photo by M. Cassell).