SDSU Extension

iGrow Soybean

BEST MANAGEMENT PRACTICES

Chapter 36:
Bean Leaf Beetle Identification, Biology, and Management

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Though problems with bean leaf beetles in soybean are sporadic and often localized, this is the second most common insect pest found in South Dakota soybean fields. Under certain conditions this pest can reduce yields. This chapter discusses bean leaf beetle identification, biology, and management.

Bean leaf beetle *(Cerotoma trifurcata)* description and biology

Description

The adult bean leaf beetle is about ¼ inch long, and can be yellow, tan or reddish in color. Typically, the bean leaf beetle wing covers are adorned with four rectangular black markings and a dark lining on the margin, but variants without these markings exist. Regardless of the presence of the rectangular markings, a black triangle is always present on the front part of the wing covers (Fig. 36.1).

The eggs, larvae and pupae of bean leaf beetles are found in the soil, making scouting for these life stages difficult and impractical. The egg is about 3/100 inch long, lemon-shaped, and orange in color. The bean leaf beetle larva is cylindrical, white in color with dark brown plates on both extremes. The size of the larva depends on its developmental stage. A mature larva is about ⅓ inch long. The beetle pupates within an earthen vessel in the soil.

Figure 36.1. Adult bean leaf beetle (*Cerotoma trifurcata*) with four rectangular markings and wing covers linings. (Photo courtesy of: Natasha Wright, Florida Department of Agriculture and Consumer Services, Bugwood.org)

Bean leaf beetle biology

Adult bean leaf beetles survive winter under leaf debris in woodlots and crop residue in soybean fields. When the average spring temperatures reach 50° to 55°F, surviving adult beetles emerge from their overwintering sites and move to various legumes such as alfalfa and sweet clover to feed and mate. In South Dakota, this usually occurs between April and May. Bean leaf beetles are strong flyers and will move to soybean when the seedlings emerge. The feeding activity of these overwintered beetles may produce appreciable damage on seedling soybean.

The female overwintered beetles move into soybean already pregnant. Throughout its lifetime, a female beetle can lay up to 40 clusters of egg with 10-30 eggs per cluster. Egg clusters are deposited in the soil surface near the base of the plant.

At a constant temperature of 82°F, the eggs take a week to hatch. At lower temperatures, this process takes longer. Hatching eggs produce larvae, which feed on soybean roots and root nodules. Depending on soil temperature, it takes between three to six weeks of root feeding before the larvae start to pupate. About a week after pupation, adult bean leaf beetles emerge from the soil. Bean leaf beetles typically have two generations per year in South Dakota.

Adult bean leaf beetles feed by chewing on soybean foliage and pods. This feeding produces characteristic round holes ("shot-holes") quite different from the jagged feeding holes produced by grasshoppers and caterpillars. Foliage feeding by the beetle may affect the yield by reducing the total leaf area available for photosynthesis (Fig. 36.4). Soybean in the vegetative growth stage is often able to tolerate defoliation and compensates by growing more leaves. Yet, defoliation tolerance depends on the quality of the growth environment. Thus in drought years, soybeans may have lower ability to tolerate defoliation.

During pod filling, bean leaf beetles feed on the pod surface. This injury can act as entry points for bacterial and fungal secondary infection. The seeds on scarred pods may become shrunken, discolored, and moldy. Occasionally bean leaf beetles feed on soybean pod stalks, clipping the pod in the process. It has been estimated that an average of one pod per beetle is lost every eight days due to beetle feeding on pod stalks.

Bean leaf beetles also acts as a vector of Bean pod mottle virus (BPMV). Overwintering beetles may retain BPMV from the previous year, although the importance of retained virus in epidemics the following year is not clear. Apart from soybean, BPMV is also found on tick-trefoil. Tick-trefoils are legumes that are generally used as a green manure. Bean leaf beetle adults that emerge in the spring may feed on infected perennial tick-trefoil, thereby acquiring the virus. The virus is transmitted to soybeans when the infected beetles move to the soybean seedlings. The subsequent generations of bean leaf beetle continue to spread the virus within and between soybean fields.

Soybeans infected with bean pod mottle virus show a range of symptoms including chlorotic mottling, leaf distortion, and leaf necrosis (Fig. 36.2). Plants infected early in the season or during period of rapid

Figure 36.2. Bean pod mottle virus symptoms: (Left) leaf mottling and (Right) leaf yellowing.
(Photos courtesy of Connie L. Strunk, SDSU Extension)

growth show the most obvious symptoms. Soybean infected by BPMV produces 3-52% lower yield depending on the soybean cultivars and the time of infection. Bean pod mottle virus infection occurring in early vegetative phase (VC or between V2-V3) causes the highest yield reduction. The seeds produced by BPMV-infected soybean may show mottled seed coats, reducing the quality of the seed (Fig. 36.3). Bean pod mottle virus infection on soybean also increases the risk of Phomopsis seed infection.

Cultural management methods for bean leaf beetles

The risk of bean leaf beetles can be reduced by seeding the soybean as late as possible (Chapter 13) within the recommended planting period. The location of late-planted soybean needs to be carefully considered. Bean leaf beetles may migrate from an adjacent infested field to a field that was seeded late.

Pesticide management of bean leaf beetles

High populations of bean leaf beetle, especially in the reproductive stage of soybean, may cause economic damage. Chemical control of bean leaf beetle may be justified when the injuries due to beetle feeding exceed an economic threshold. Defoliation and pod feeding are the two main ways bean leaf beetles inflict injury; and the beetle is not the only defoliating pest infesting soybean. When other defoliators, such as grasshoppers and caterpillars, coexist in a soybean stand, it is useful to consider their accumulative damage when making a control decision. This can be done by estimating the amount of leaf area lost to all insect feeding in the field; a decision to treat or not is based on the overall defoliation rate based on the guidelines below. Some labeled pesticides for bean leaf beetle are provided in Table 35.2, Chapter 35.

Figure 36.3. Seed coat of (A) healthy and (B) BPMV infected seeds. (Photo courtesy of Connie L. Strunk, SDSU Extension, Bugwood.org)

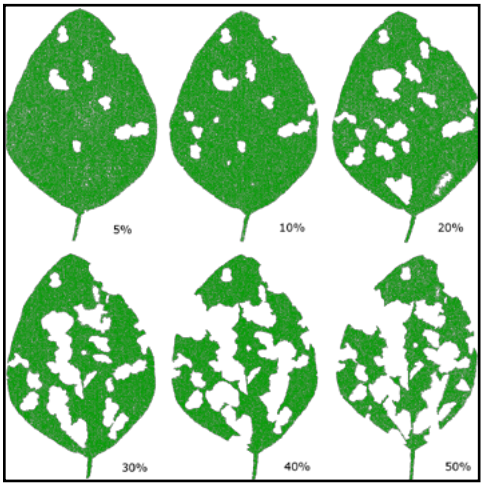

Figure 36.4 Soybean leaflets with various percentages of foliage removed by insect feeding. (Adapted from Kogan and Turnipseed, 1980)

Estimating insect-inflicted defoliation rate on soybean

1. Randomly select 10 plants from the field and pick a trifoliate leaf from the top, middle, and lower third of these plants.
2. Discard the most and least damaged leaflets from each trifoliate. This will leave you 30 leaflets to assess the defoliation rate.

3. Compare each leaflet with the illustration provided in Figure 36.4, record the defoliation percentage of each leaflet, and determine the average defoliation percentage of the whole batch.
4. Repeat Steps 1-3 at four or more randomly selected sites within the field.

Treatment is warranted if defoliation exceeds 40% during vegetative stages of soybean development and is expected to increase (i.e., if insect feeding activity is still evident in the field). During pod-forming and pod-filling stages, a field should be treated if defoliation rate exceeds 20%. Because bean leaf beetles also feed on pods, damage to pods should also be monitored. Control is warranted if pod damage exceeds 10% during pod-fill.

References and additional information

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Websites

www.npipm.org
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Acknowledgements

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