INTEGRATED CROP MANAGEMENT

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Insects and Mites

Southern corn leaf beetles in young corn

by Marlin E. Rice, Department of Entomology

The southern corn leaf beetle is one of those odd insects that has caused some stand loss in southern Iowa during the last couple of years. A few problems are now occurring in eastern Iowa. Brad Van Kooten (Pioneer Hi-Bred International) found 20 to 25 percent of plants with feeding damage in a Washington County field on May 29. The corn was V2–V3 near a Conservation Reserve Program field and a wooded area. Last year, the field had been in switchgrass.

Also in southeastern Iowa, on May 30, Mick Kruse (Chem Gro, Houghton) reported southern corn leaf beetles in the Mt. Pleasant and Burlington areas. He noted that in some areas around field edges, about one in every four plants had injury but in the middle the injury was much less, about one in 10 plants. He also noted that injury was found only on the older leaves.

Southern corn leaf beetle.

The adults feed on stem and leaf tissues of seedling corn plants. Injured corn plants are ragged because of the notched out leaves. If sufficient numbers of southern corn leaf beetle adults are present, seedling corn plants can be killed. Some entomologists have suggested that southern corn leaf beetle injury has often been misdiagnosed as cutworm injury, especially with respect to stem-feeding injury.

There are no specific economic thresholds for this insect. However, consider the following thresholds, which have been used for other early season leaf-feeding pests of corn. A rescue treatment should be considered when 25 percent of

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the seedling corn plants are injured within a field. If southern corn leaf beetle feeding on stem tissue results in cutting of seedling corn plants, you may want to consider the cutworm threshold suggested by Iowa State entomologists previously, and use a rescue treatment when 3 percent or more of the plants are cut.

Insecticides labeled for rescue treatment include Capture 2EC (2.1–6.4 oz/acre), Mustang Max (2.72–4.0 oz/acre), and Lorsban 4E (1–2 pt/acre). The label indicates that Capture and Mustang Max should be applied in a minimum of 10 gal of finished spray per acre with ground equipment. The Lorsban label does not recommend a gallonage for southern corn leaf beetles, but it does recommend 20–40 gal of water per acre for several other insects. These products are restricted-use insecticides and can be applied only by certified applicators. Please read and follow all product labels for more specific application instructions.

More information on the southern corn leaf beetles may be found at http://www.ipm.iastate.edu/ipm/icm/2001/5-14-2001/sclbeetle.html.

Marlin E. Rice is a professor of entomology with extension and research responsibilities in field and forage crops.

Plant Diseases

Bean pod mottle virus and other soybean viral diseases

by XB Yang, Department of Plant Pathology

Viral diseases have been a major soybean production problem in Iowa in recent years, and these diseases are likely to occur again this year. Iowa State University field specialists in crops reported occurrence of bean leaf beetles, one of the vectors of bean pod mottle virus (BPMV), in many early planted soybean fields. According to the report of The Third North Central Soybean Virus Conference last year, BPMV incidence was high in the 2002 growing season. Bean leaf beetle activity early this summer will be an indication of risk of BPMV this year. For management of this disease, control of bean leaf beetles is essential.

Besides BPMV, there are several other potential soybean viral diseases in Iowa and neighboring North Central states. These diseases are soybean mosaic virus (SMV), alfalfa mosaic virus (AMV), tobacco streak virus (TSV), and tobacco ring spot virus (TRSV). ISU field specialists in crops also reported occurrence of alfalfa mosaic virus in Iowa in the past 2 years. In northwestern Iowa, Joel DeJong found green soybean fields infected with alfalfa mosaic virus, despite high prevalence of BPMV in the last few years.

If you experienced a substantial amount of discolored soybean seeds or late maturing green plants but did not see high bean leaf beetle populations, other viral diseases could have been the cause. To identify a specific viral disease, testing is required, even though it is time-consuming and expensive. Currently, virologists are developing methods for rapid testing and identification of plant viruses. If you rule out the involvement of BPMV in a green stem soybean field but did not test, distribution of green soybean plants in the field can serve as an indication of possible disease problems.

When later mature green plants mainly occur on the edge of soybean fields, it is an indication that viral diseases with insect vectors other than bean

Green soybean along Conservation Reserve Program land (photo by Mike White).

Green soybean with alfalfa (photo by Joel DeJong).

leaf beetles are likely to be the cause. For BPMV, overwintering beetles normally feed throughout a soybean field; thus, infected plants are located throughout the field. Two years ago, Joel DeJong observed a soybean field with rows of green plants along Conservation Reserve Program land that was not sprayed with any insecticides (see photo on page 82). The disease was unlikely to be BPMV.

Some soybean viruses (AMV, TSRV, and TSV) are harbored in grasses or weeds located in ditches or alfalfa fields adjacent to soybean fields in the absence of soybean. Because their insect vectors (aphids or thrips) have limited dispersal capability, these insects only move a few rows into a soybean field during cutting of alfalfa or mowing of grasses or weeds. Thus, these viruses only infect several rows of soybean plants along the edge of a field. Two years ago, Mike White observed that green soybean extended along the edge of a soybean field and stopped where alfalfa ended, an indication of the possibility that the virus was harbored in alfalfa and spread a short distance (see photo, this page).

For management of viral diseases, controlling the movement of insect vectors into soybean fields is effective. This summer, consider innovative practices that reduce the movement of virus vectors when you cut weeds or harvest alfalfa along soybean field edges that had green stem problems 2 years ago.

XB Yang is an associate professor of plant pathology with research and extension responsibilities in crop diseases.

Insects and Mites

Bean leaf beetle, bean pod mottle virus, and host plant resistance

by Jeffrey Bradshaw and Marlin E. Rice, Department of Entomology

Very few management strategies are available for controlling or suppressing bean leaf beetle and bean pod mottle virus. With pests in some crops, host plant resistance has been successfully used to lessen the amount of damage caused to the crop. Unfortunately, no commercial soybean cultivars with resistance to bean leaf beetle or bean pod mottle virus are available. However, research is underway to study host plant resistance to both the beetle and the pathogen.

Bean leaf beetle resistance. In 2001, researchers at The Ohio State University identified two soybean germplasm lines as resistant to bean leaf beetle, western corn rootworm, and Japanese beetle (all known vectors of bean pod mottle virus). These soybean lines reduce the amount of foliar feeding by beetles; however, they do not significantly reduce their abundance. These results indicate that these soybean lines are somehow unfavorable to beetles. These soybean lines offered little resistance to pod feeding by bean leaf beetles; however, their ability to reduce feeding (especially foliar feeding) does indicate the potential for bean pod mottle virus management.

Bean pod mottle virus resistance. Also in 2001, University of Kentucky researchers developed some transgenic soybean lines that are protected against bean pod mottle virus infection. Some of their transgenic lines have shown resistance against bean pod mottle virus, both by mechanical inoculation and by bean leaf beetle transmission. The researchers' goal is to incorporate

their bean pod mottle virus-resistant soybean lines into commercial varieties.

Long-term pest management. At Iowa State University in 2001, researchers found that soybean hairs have an effect on bean leaf beetle injury to pods. Three soybean lines of the same variety that varied from hairless to densely hairy pods were studied. The bean leaf beetles fed more on hairless pods and preferred hairless pods more than densely hairy pods. Currently, we are researching the effects of soybean hairs on bean leaf beetle. We are studying the effect of soybean pod and leaf hairs as a feeding deterrent to bean leaf beetle. Furthermore, we are studying the effect of leaf hairs on the transmission of bean pod mottle virus. If effective, this form of resistance could be useful for managing direct injury from bean leaf beetle and reduce bean pod mottle virus incidence. Although no resistance strategies against bean leaf beetle and bean pod mottle virus are available for growers, they may be on their way. Eventually, the long-term management of this pest complex will probably involve a combination of host plant resistance, planting date, and insecticides.

Jeffrey Bradshaw is a graduate research assistant studying bean leaf beetles. Marlin E. Rice is a professor of entomology with extension and research responsibilities in field and forage crops.

Soils

Timing and conditions for cultivation

by Mahdi Al-Kaisi, Department of Agronomy; Mark Hanna, Department of Agricultural and Biosystems Engineering; and Michael Tidman

Late spring is "erosion season" because of all the exposed soil that is vulnerable to erosion. By this time of year, there has been time for significant decomposition of residue from the previous year's crop. There also may have been significant amounts of residue turned under during fall and spring tillage operations, as well as planting, and possibly one time through with the cultivator. Because crop residue levels are at their lowest, and because a blanket of crop residue is your best defense against erosion, the soil's defenses are down. Now is the time to go out and measure or estimate your crop residue and see whether you're hitting the target of 30 percent remaining on the soil surface. And because many producers have had a "late spring," crops have not yet achieved canopy, leaving the exposed soil even more susceptible to rainfall. Add in the effect of seasonal rainfall such as hard-driving June thunderstorms, and you have a recipe for erosion.

Cultivation—when to go, when to wait. If you haven't been to the field with the cultivator yet, remember the best reasons for cultivating are to eliminate serious weed pressure and to break up soil crusts. If you don't have one of these conditions, it's best to leave the cultivator in the shed. Do some weed scouting and see whether weed problems are developing. Is your herbicide program holding or catching up, or does it need help?

Check for soil crusting. See whether crops are having a hard time breaking through or if rainwater is going to have a hard time infiltrating the soil because of a hard soil crust. And, if you've already been through the field once with the cultivator, wait and see what effect you've had on the weed population or crusting.

Cultivator and conventional tillage operators should look at soil moisture. Cultivation has a significant impact on soil moisture retention; therefore, consider the amount of soil moisture at the top 6 inches before cultivating. Most locations

Importance of crop residue in reducing soil erosion

The amount of soil lost due to erosion each year is directly related to the amount of crop residue remaining on the soil's surface. Good soil managers intentionally leave as much of the past year's crop residue on the soil surface as possible.

Crop residue cushions the force of pounding raindrops, which can easily dislodge soil particles, "splashing" them as far as 3 feet away from their origin. This soil splash is only the beginning of the problem. Splashed particles clog soil pores, effectively sealing off the soil's surface. Instead of infiltrating the soil, rainwater thus collects and moves down slope, carrying with it the dislodged soil particles.

Crop residues retard the process of soil erosion by limiting soil splash and protecting the soil's surface from impact of raindrops. Levels of crop residues, therefore, are a direct indicator of how well soil is protected from water erosion.

in Iowa currently have adequate levels of soil moisture, but be aware of the effect cultivation has on soil moisture. Remember that it's not unusual to move quickly in and out of wet and dry cycles in Iowa. Conserving soil moisture is never a bad idea.

Observation, observation, observation! The best managers are aware of field conditions on a day-to-day basis. If you've had some hard rains, take time to inspect your fields for erosion problems and runoff patterns. Look for indicators of where waterways, contouring, and filter strips may be needed to reduce, control, or eliminate erosion, and make plans to get them in place soon. With the wet spring we've had so far, compaction also could be a potential problem. Compaction limits the ability of rainwater to infiltrate the soil and could lead to erosion as well.

Effects of soil erosion. Soil erosion is a serious problem: it leads to impaired water quality, crop damage, and deterioration of the productivity of a farmfield. When producers don't address soil erosion issues in the spring, erosion may contribute to the transport of sediment, nutrients, and agricultural chemicals into water bodies.

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Insects and Mites

Corn rootworm hatching predicted

by Marlin E. Rice, Jon Tollefson, and Rich Pope, Department of Entomology

If you asked us when corn rootworm larvae hatch in Iowa, our standard answer would be June 6. This date is an average date and will be earlier in southwestern Iowa and later in northeastern Iowa. With the cooler May this year, some people want to know whether hatch will be delayed, and if so, by how much.

During the 1980s and 1990s, Purdue University entomologists sampled corn rootworm eggs to document when hatch occurs and the first larvae feed on corn roots. During that time, the earliest larvae were detected at 583 degree days, the latest at 684 degree days, and the average at 622 degree days. Degree days were accumulated from January 1 and a base of 50°F was used. These data can be used to estimate corn rootworm larval hatch in Iowa. The table predicts the 2003 rootworm hatch by using heat units accumulated from January 1 to June 2 and an estimate of 18 degree days accumulated per day after that date.

Predicted date of corn rootworm hatch as of June 2, 2003

CRD	Early	Average	Late
NW	May 31	June 3	June 7
NC	June 1	June 3	June 7
NE	June 3	June 5	June 9
WC	May 26	May 30	June 2
C	May 27	May 30	June 3
EC	May 28	May 31	June 4
SW	May 22	May 25	May 29
SC	May 24	May 26	May 30
SE	May 25	May 26	May 31

CRD, Iowa crop reporting district.

These data also suggest that larvae began hatching at the end of May and the first week of June. This timing is about normal; about June 6 is the general hatch date that we use. How could this be, with cooler temperatures during the planting period? The Purdue predictions begin accumulating temperature on January 1. The weather this spring, before May, had been warmer than average, so the warmer early temperatures balance out the cooler May temperatures.

There was an extended corn planting period this spring. With normal corn rootworm hatch, extended planting may mean that hatch occurs when some corn is fairly small. The smaller root systems in some of the later planted corn will cause increased larval mortality. The mortality is not sufficiently high to eliminate the need for an insecticide, unless corn is planted after June 5. This year, most of the corn was planted by this date. If corn is replanted after June 5, however, the need for an insecticide treatment will be reduced.

Marlin E. Rice and Jon Tollefson are professors of entomology with extension and research responsibilities in field crops. Rich Pope is an extension program specialist in entomology with responsibilities in integrated pest management and pesticide applicator training.

Insects and Mites

Impact of planting date on corn rootworm damage

by Marlin E. Rice, Department of Entomology

Delayed corn planting in many parts of Iowa has prompted questions about the impact of planting date on corn rootworm damage and about the need for a soil insecticide. A 2-year study conducted in the North Central states has shown a very strong relationship between planting date of field corn and corn rootworm damage to the roots. For each 10-day delay in planting after April 1, the average root damage rating (1–6 scale) in Iowa would be expected to decrease by 0.75 unit. As an example, if corn was not planted on April 20 but instead planting was delayed until June 1, then the average root rating could be expected to drop by 3.0 units in that field. Similar reductions would be seen in Illinois (0.8 unit), Minnesota (0.7 unit), and Nebraska (1.1 units) for each 10-day delay.

The same study suggests that corn planted after about June 1 in Illinois and Indiana and after about June 5 for Minnesota and Nebraska would not receive enough root damage by northern and western corn rootworms to warrant insecticidal treatment. No date was given for Iowa but based upon the available data, June 5 seems to be an appropriate date after which Iowa growers would not have to apply a corn rootworm insecticide because root damage would not be expected to reach the damage threshold. This information was obtained from a study published in the journal *Annals of the Entomological Society of America* 73: 207–215 (1980).

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Corn with no significant injury from corn rootworm larvae stands straight.

Insects and Mites

Identifying the multicolored Asian lady beetle

by Jeffrey Bradshaw and Marlin E. Rice, Department of Entomology

In our May 19 article concerning bean leaf beetle identification, we mislabeled one species, the multicolored Asian lady beetle. The multicolored Asian lady beetle is a beneficial insect outdoors and an occasional nuisance indoors. Correctly identifying this beetle over the other lady beetles is important, but not always easy. In fact, sometimes even the experts are fooled.

Often, the multicolored Asian lady beetle is characterized by a black mark resembling the outline of an “M” or a “W” behind its head. However, much like its spot pattern, the marks behind its head can vary between individuals. These black markings can be present as spots (Fig. 1) or merge together (Fig. 2), leaving the area behind the head mostly black.

Fig. 1. Multicolored Asian lady beetle with markings behind head present as spots. A “W”-shaped mark can be traced if you connect the spots.

Fig. 2. Mutlicolored Asian lady beetle with markings behind head merged. A “W”-shaped marking is barely visible.

Insects and Mites

Overwintered bean leaf beetle numbers are down

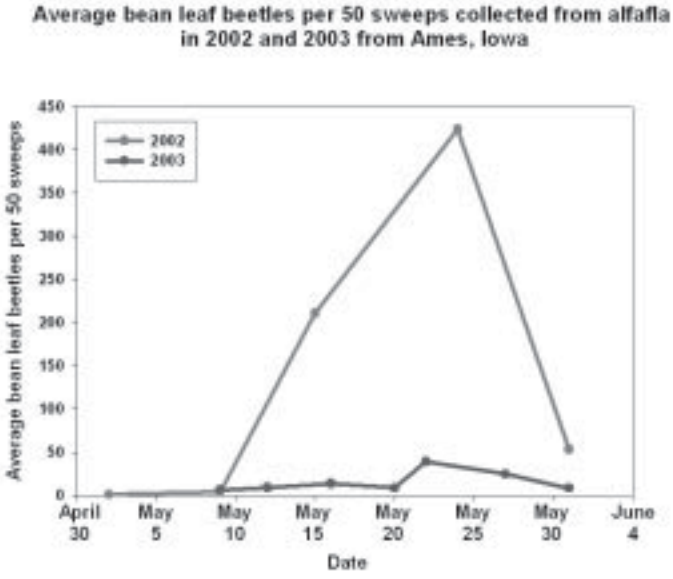
by Jeffrey Bradshaw and Marlin E. Rice, Department of Entomology

As our overwintering survival model predicted, bean leaf beetle numbers are lower than those from last year. Typically, bean leaf beetles first fly to alfalfa as soon as they emerge from overwintering sites. As part of our monitoring program for bean leaf beetles, we sample alfalfa every spring for bean leaf beetles. We have passed the peak abundance of bean leaf beetles in alfalfa and are well below last year's record number of beetles. Last year's bean leaf beetle abundance in alfalfa was more than 400 beetles per 50 sweeps, whereas this year's beetle count was less than 50 (see graph). So, what does this mean? We expect that bean pod mottle virus will be less of an issue this year than last and that late-season injury will be less. However, if mid-July rains are few, bean leaf beetle could rebound by August.

Differences in beetle populations also are based on planting dates. Small plots were examined last week that had been planted on April 29 and May 13. On May 30, the early soybean had one trifoliate leaf partially expanded, whereas the later soybean had only unifoliate leaves open. Although these soybean plots were side by side, the differences in beetle populations were striking. The early planted soybean averaged 12.3 beetles per 3 row feet, whereas the later planted soybean averaged 5.3 beetles per 3 row feet. These numbers mean that there were 2.3 times more beetles in the early planted than in the late-planted soybean. This beetle count information supports our recommendation that later (and not necessarily LATE) planted soybean would benefit by being subjected to smaller populations of beetles.

Jeffrey Bradshaw is a graduate research assistant studying bean leaf beetles. Marlin E. Rice is a professor of entomology with extension and research responsibilities in field and forage crops.

Bean leaf beetles feeding on soybean.



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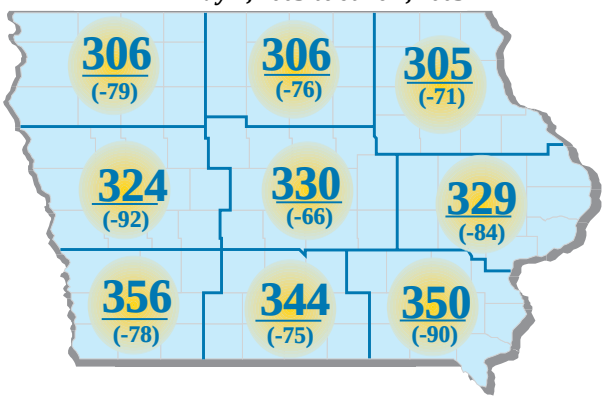
Degree Days

Four-fifths of a month

by Rich Pope, Department of Entomology

Accumulated base-50 F degree days for the first month of the growing season were about 80 percent of long-term normal across Iowa. Although the effect for the rest of the season is likely to be minor, the cool weather has influenced some of the slow crop emergence and occasional crop seedling disease situations reported across Iowa. Corn and soybean planting is now nearly complete, and crops are emerging in fairly good condition statewide.

Accumulated base 50 F degree days
May 1, 2003 to June 1, 2003



accumulated degree days
(departure from average)

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