

INTEGRATED CROP MANAGEMENT

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Plant Diseases

More on soybean viral diseases

by XB Yang, Department of Plant Pathology

In a June 9 *ICM* newsletter article, I discussed the likely cause of later maturity or green stems of soybean along field edges, a situation that occurred in Iowa 2 years ago. That article prompted questions on soybean viruses and management options.

What viral diseases of soybean occur in Iowa? Several soybean viral diseases occur in Iowa, including soybean mosaic virus (SMV), alfalfa mosaic virus (AMV), tobacco streak virus (TSV), tobacco ring spot virus (TRSV), and bean pod mottle virus (BPMV). BPMV has been a major production problem in Iowa in recent years.

What are the hosts for these viruses? Of the viruses mentioned above, SMV has the most narrow host range. The other viruses infect several legumes, which are common near soybean fields in

Iowa. BPMV has a moderate host range, including alfalfa, red clover, and birdsfoot trefoil. AMV and TRSV have a wide host range. In the absence of soybean, AMV, TRSV, and TSV can be harbored in weeds or other plants located in ditches or in alfalfa fields adjacent to soybean fields.

How are the viruses spread? All of the viruses mentioned here can be seedborne, but they differ in efficacy of seed transmission (Table 1). For BPMV, research has shown that transmission through infected seeds is low. For SMV and TRSV, the virus is more readily transmitted through infected seeds. In regions where these two diseases are prevalent, beans from infested fields should not be saved for seeds. When healthy seed is used, the viruses are transmitted to soybean by virus-carrying insects that feed on infected nearby weeds.

What insects are vectors? These viruses are transmitted by insects during a growing season, and each virus has a specific group of vector insects. Mobility of virus vectors is critical to the level of disease occurrence in a production field. For BPMV transmitted by bean leaf beetles, the disease spreads throughout a field because of the



Virus-infected soybean leaf.

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Table 1. Soybean viral diseases in Iowa.

Virus	Nonsoybean Host Range	Vector	Seedborne Efficacy	Virus from Outside Fields
BPMV	Moderate	Beetles	Very low	High
SMV	Narrow	Aphids	High	Very low
AMV	Wide	Aphids	Very low	High
TRSV	Wide	Thrips	High	High

movement of the beetles. Insects with limited dispersal capability, such as thrips, only move a few rows into a soybean field during cutting of alfalfa or after mowing grass or weeds.

What is the distribution pattern of infected plants? Vector movement determines the distribution patterns of infected plants in a field. For TRSV, because thrips move only a short distance from virus-harboring plants into soybean fields during the growing season, green stems or later maturing plants are concentrated along field edges. For BPMV, the infected plants should occur throughout the field because the overwintering beetles feed throughout a field. For SMV, the combined effects of seed transmission and aphid

movement result in infections throughout a field.

What are some management options?

SMV has not been a production concern in recent years.

Management options for BPMV have been

widely practiced by producers in Iowa, and I will not discuss them. If you had green stem problems (2 years ago) with a distribution caused by TRSV, consider mowing plants outside the field early in the season. Fewer weeds near soybean fields means reduced vector populations, thus less spread of virus. Mowing in mid-season when insect populations are high should be avoided because the equipment disturbs virus-carrying insects that may then move into soybean fields. Spraying insecticides along soybean field edges where the problems occurred can control the spread of insects and disease.

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



Insects and Mites

Young grasshoppers are no cause for concern

by Marlin E. Rice, Department of Entomology

Young grasshoppers can now be found along some field margins or occasionally farther into a soybean field. Grasshoppers, more than any other insect, seem to generate concern about impending crop injury and thus a desire to kill them before disastrous field effects. Much of this concern is unnecessary, especially if the grasshoppers are confined mostly to the field margins.

There are no good economic thresholds for grasshoppers in either soybean or corn. Old thresholds recommended that grasshoppers per square yard be counted, but this approach is frustrating. Counting grasshoppers in soybean is near impossible because they hide in the foliage or they hop out of the area you're trying to count. I suggest that the focus be on the amount of leaf defoliation, combined with a nominal threshold (one based on experience) and a little common sense, in managing grasshoppers. It is usually not too difficult to determine whether grasshoppers are abundant, so forget trying to count the number per square yard.

Consider treatment if grasshoppers are present and defoliation reaches 40 percent in the prebloom stages or 20 percent in the pod-forming and pod-filling stages. Reductions in yield can occur during any crop stage and pod-forming and pod-filling stages are at greater risk than other plant stages. A 40 percent leaf loss during any vegetative stage results in only a 3–7 percent yield reduction. Defoliation of 20 percent during the pod-forming and pod-filling stages will result in similar yield reductions.

In soybean, determine the exact location of grasshoppers in the field and spray only those areas. Grasshoppers are often concentrated along field edges, but they sometimes occur in large areas out in the center of the field, especially if weeds were present last year to attract the egg-laying females. Also, soybean fields that are sprayed with herbicides can make a grasshopper situation worse because the insects move from the dead weeds to the soybean plants, so these areas should be closely monitored.

The adult grasshoppers are generally more of an economic concern than the nymphs. As the nymphs in soybean mature into adult grasshoppers, watch for leaf loss during late July, August, and September. Fortunately, some insecticides provide excellent control of adult

grasshoppers, and this information will be printed in an upcoming *ICM* newsletter.

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



Insects and Mites

Recognizing early-season insect injury in soybean

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

Several species of insects may feed on seedling soybean leaves in Iowa. The most common is bean leaf beetle, but soybean leafminers also may be abundant in some fields.



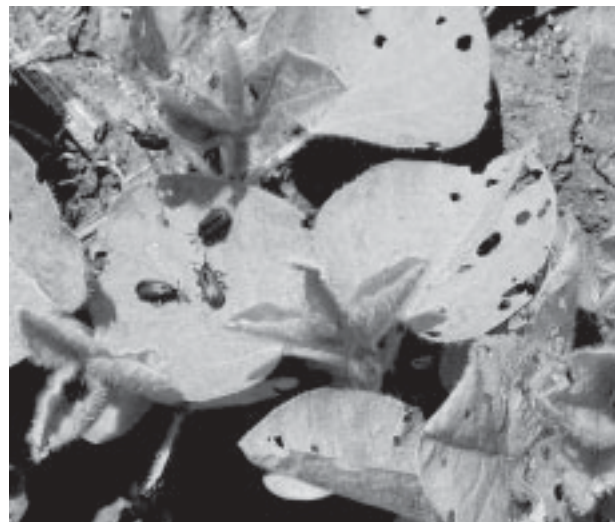
Soybean leaflet with feeding injury from bean leaf beetles (open holes) and soybean leafminers.

Similarities between the two species are that they overwinter as adults, feed on soybean leaves, and transmit bean pod mottle virus. However, the feeding injury caused by these two insect species is dramatically different. Bean leaf beetles eat completely through a leaf, leaving an open hole ranging from the size of a BB to about twice the diameter of a pencil eraser. These holes may be circular to oval and very elongate. In contrast, soybean leafminers remove only the tender portions of the

leaf, leaving a lacy network of veins. On young leaves, the soybean leafminers eat completely

through the leaf, but on older, and tougher, leaves they only scrape the leaf surface but the network of leaf veins still can be seen. Photographs of injury on older leaves may be viewed at <http://www.ipm.iastate.edu/ipm/icm/2002/8-19-2002/leafminers.html>.

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



Soybean leafminers feeding on young soybean plants.

June Field Days Are Scheduled

Iowa State University Research and Demonstration Farms are hosting several field days this summer. The June field days are listed below.

- June 18, 1 p.m., Southeast Research Farm, Crawfordsville
- June 19, 3:30 and 5:30 p.m., Armstrong/Lauren Christian Swine Farm, Lewis and Atlantic
- June 24, 1:30 p.m., Northeast Research Farm, Nashua
- June 25, 9 a.m., Northwest Research Farm, Sutherland
- June 26, 9:30 a.m., Northern Research Farm, Kanawha

A complete listing of all the field days is located at <http://www.ag.iastate.edu/farms/fielddays.html>. For more information, please call the Research and Demonstration Farms office at (515)-294-5045.

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Degree Days

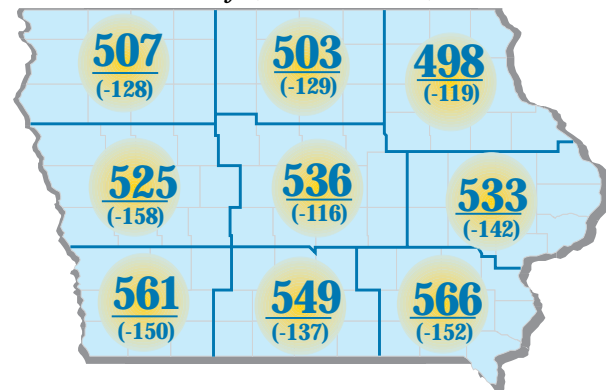
Crops greening up statewide

by Rich Pope, Department of Entomology

Finally, a relatively warm week has spurred the development of both corn and soybean across Iowa. Both crops have greened up and growth is rapid. Iowa State University field specialist in crops reported herbicide drift concerns, probably spurred by producers who were taking advantage of the favorable weather to get weeds under control. Overwintering populations of bean leaf beetles are nearly gone. Sufficient degree days (base 41°F) have accumulated for stalk borers to begin moving from field edges into border rows (in southern Iowa, by June 12 and in northern Iowa, by June 20).

Rich Pope is an extension program specialist in entomology with responsibilities in integrated pest management and pesticide applicator training.

Accumulated base 50 F degree days
May 1, 2003 to June 15, 2003



accumulated degree days
(departure from average)

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