INTEGRATED CROP MANAGEMENT

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Plant Diseases

Now's the time to scout for SCN

by Greg Tylka, Department of Plant Pathology

Soybean cyst nematode (SCN) is an important, widespread soybean pest in Iowa that often goes unnoticed. To date, the nematode has been discovered in all but five Iowa counties. The only consistent and reliable sign of an SCN infestation in the field is the presence of adult SCN females and cysts (dead females) on the roots of infected soybean plants. Adult SCN females and cysts are small, round, and white to yellow, each approximately the size of a period at the end of a sentence.

SCN females are beginning to occur on the roots of soybean that were planted in the latter part of May. Consequently, now is the time to begin scouting fields for SCN by checking soybean roots for females and cysts. You can see females and cysts on roots of infected plants through much of the growing season, until late summer or early fall when the plants begin to mature. But, it is much easier to observe the nematode on soybean roots early in the season because the females and cysts are present on new roots that can be easily dug from the soil surrounding the base of the stem of the plant. Later in the season, adult SCN females and cysts occur on new roots that are located deeper down in the soil as well as farther laterally from the stem of the plant.

Small, cream-colored SCN females on the roots of a soybean seedling.

To scout for SCN in fields where the nematode has not yet been found, you may target fields in which soybean has been grown frequently in the past and fields where soybean yields have declined over time for no apparent reason. Because SCN is spread by the movement of infested soil, checking roots of plants near the entrance of fields where farm equipment enters and along fence lines where wind-blown soil accumulates

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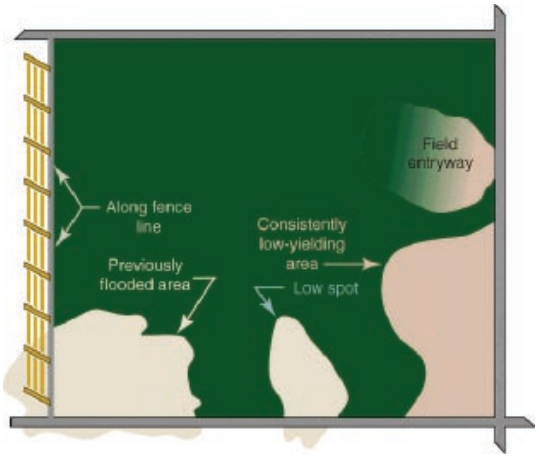

Likely spots where SCN might first appear in a field.

also may increase the likelihood of finding SCN-infected plants.

Collecting soil samples from fields suspected of being infested with SCN is an alternative to digging soybean roots and looking for adult females and cysts. Soil sampling can be done at any time during the growing season. Soil samples should be submitted to a private soil testing laboratory that offers nematode testing or to the ISU Plant Disease Clinic for extraction and counting of SCN eggs. Samples sent to the ISU Plant Disease Clinic should be accompanied by a completed *Plant Nematode Sample Submission Form* (ISU Extension publication PD 32, see below for ordering information), and there currently is a $15 per sample charge for processing each sample ($20 per sample for out-of-state samples). Detailed instructions on how to collect a representative soil sample for detection of SCN can be found on the back of PD 32.

ISU Extension publication IPM 47s, *Scouting for Soybean Cyst Nematode*, illustrates the recommended procedures for scouting for SCN. Single copies of this publication are available free of charge from county extension offices or from the Extension Distribution Center by calling (515) 294-5247. Additional information about SCN can be found on the Web at www.soybeancyst.info.

Greg Tylka is a professor of plant pathology with extension and research responsibilities in management of plant-parasitic nematodes.

Soils

Did the spring rains catch your soil exposed?

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

Much of Iowa has had wet weather this spring, which has provided an opportunity for producers to see whether their conservation plans are working as intended. Conservation tillage managers should be in the field checking on their first line of defense in the battle against soil erosion—crop residue.

Getting the right residue count in 2003 started long ago, but post-planting residue counts are the best way to assess the effectiveness of a conservation tillage management system. Producers should shoot for at least 30 percent of the previous year's crop residues remaining on the soil's surface after planting. First, check crop residues now to reveal the actual situation versus just good intentions. If residue counts aren't where they should be, rethink the management strategy you implemented for tillage and residues for the next crop season.

Second, look for secondary weak spots in your conservation plan. The best place to start is during mowing. It's generally recommended that producers hold off mowing waterways until June 15 to allow for bird nesting. Now that June 15 has come and gone, producers should be mowing waterways and other grassed areas.

While mowing, be aware of crossing gullies hidden by plant growth. Stop the tractor and inspect the waterways, buffers, field borders, tile inlets, terraces, and drainage outlets. Did the practices function as intended? Are improvements or modifications needed? Was there any structural damage? If so, what are the repair plans?

It's also a good time to take a broader look at conservation in your operation. Think about the conservation practices that would have worked for you this spring. Every operation probably has at least one or two areas where a new conservation practice would make a significant difference. What can you do to start planning for them right now?

Early summer is a good time for assessing the need for new waterways, buffers, and terraces, or other conservation practices or structures that would improve the environmental performance of your operation. There's plenty of time to line up resources, enroll in conservation programs, and

apply for federal or state cost-share funds, if applicable.

Professional assistance is also important. Getting assistance from the Natural Resources Conservation Service (NRCS) or your local soil and water conservation district can put you in the driver's seat as far as being ready for conservation structure installation.

There are also new incentives from the USDA for greenhouse gas reduction and carbon storage. The USDA will consider greenhouse gas management practices when evaluating applications for the Environmental Quality Incentives Program (EQIP), the Conservation Reserve Program (CRP), and the Forest Land Enhancement Program (FLEP). There are financial incentives, technical assistance, demonstrations, pilot programs, and education available.

Contractors and supplier schedules are more likely to be open now, too, as opposed to trying to line them up during harvest. If you need to open up the field for them to get the work done, you can preferentially remove crop to get contractors in early and get the work done before winter. Assessing your conservation plan now also gives you time to research new crop management systems, equipment, and management systems so you can find those that best fit your land and individual operation.

Late June is a good time to see where your operation can improve in conservation practices and make serious plans to remedy existing or potential problems. Once the crop reaches canopy, the problems will be out of sight, and probably out of mind until fall, when you'll be too busy with harvest to worry about them. So, now is the time to flex your operation's soil conservation muscles!

Mahdi Al-Kaisi is an assistant professor in agronomy with research and extension responsibilities in soil management and environmental soil science. Mark Hanna is an extension agricultural engineer in ag and biosystems engineering with responsibilities in field machinery. Michael Tidman is a farmer and freelance writer from Urbandale, Iowa. *Funding support provided by USDA Natural Resource Conservation Service through Cooperative Agreement No. 74-6114-10-03.*

Insects and Mites

Scout bean leaf beetles in July to predict late-summer damage potential

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

Second generation bean leaf beetles feeding on soybean pods can lead to significant reductions in seed quality and yield. Management during the pod-setting and -filling stages can be frustrating because beetles may feed on pods for a couple of weeks before the population reaches the economic threshold. In this situation, some loss in seed quality and quantity occurs before an insecticide application can be economically justified. Research from Iowa State University was used to develop a management program for second-generation bean leaf beetles based upon the population size of the first-generation bean leaf beetles. This article explains this management concept. Note also that this procedure does not manage for the bean pod mottle virus.

The beetle has three populations a year in Iowa. The overwintered population, which fed on soybean during May through June, is actually the second-generation beetles from last year that hibernated through the winter. Females from the overwintered population lay eggs that develop into first-generation beetles that emerge in July. First-generation adult populations usually peak in the late vegetative or the early reproductive soybean stages, whereas the second-generation adults peak during the pod-fill stage. Feeding by first-generation beetles on soybean leaves in July and early August seldom results in economic yield losses, but second-

Table 1. Degree-day accumulations for first generation bean leaf beetle adults (1212 degree-days with developmental threshold of 46°F) from the date of soybean emergence through June 22, 2003.

	Degree-Day Accumulations				
Date of Soybean Emergence	Decorah (Northeast)	Burlington (Southeast)	Des Moines (Central)	Omaha (Southwest)	Spencer (Northwest)
May 1–9	751	870	959	885	778
May 10–19	663	740	839	780	698
May 20–31	544	600	696	645	575
June 1 or later	375	411	460	425	390

generation feeding on pods in August and September can be significant.

A degree-day model was developed to estimate the occurrence of first-generation adults in the field. The degree days for the first-generation adults were 1212 degree days with a developmental threshold at 46°F. The overwintered female beetles usually begin to lay eggs after colonizing the bean fields. The degree-day estimation for the first-generation adults is calculated by accumulating the temperature at the week of soybean emergence. Table 1 shows the accumulated degree-days for the first-generation adults in five different areas of Iowa. Table 2 shows the dates predicted for the peak emergence of first-generation adults at these locations.

Table 2. Predicted dates for peak emergence of first-generation bean leaf beetle adults.

Date of Soybean Emergence	Decorah (Northeast)	Burlington (Southeast)	Des Moines (Central)	Omaha (Southwest)	Spencer (Northwest)
May 1–9	July 11	July 6	July 3	July 6	July 10
May 10–19	July 14	July 11	July 7	July 10	July 13
May 20–31	July 19	July 16	July 13	July 15	July 17
June 1 or later	July 25	July 24	July 21	July 23	July 24

The first generation can be sampled to predict the size of the second generation. Tables 3 and 4 refer to the size of the bean leaf beetle population that is occurring in the field during July. These are first-generation beetles. If this population exceeds the thresholds, the field should not be sprayed now, but instead sprayed later during the second-generation of beetles, which occur sometime in mid-August. Sampling the fields now helps to predict the possibility of economic pod damage at the beginning of pod growth and development a month from now.

Table 3. Economic thresholds for first-generation bean leaf beetles (average number of beetles per 3 foot of row).

	Management Cost ($/acre)								
$/bu	7	8	9	10	11	12	13	14	15
15	2.0	2.2	2.5	2.8	3.0	3.3	3.5	3.8	4.1
14	2.1	2.4	2.7	2.9	3.2	3.5	3.8	4.1	4.3
13	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.3	4.6
12	2.4	2.8	3.1	3.4	3.7	4.1	4.4	4.7	5.0
11	2.6	3.0	3.3	3.7	4.1	4.4	4.8	5.1	5.5
10	2.9	3.3	3.7	4.1	4.4	4.8	5.2	5.6	6.0
9	3.2	3.6	4.1	4.5	4.9	5.3	5.8	6.2	6.6
8	3.6	4.1	4.5	5.0	5.5	6.0	6.5	7.0	7.5
7	4.1	4.6	5.2	5.7	6.3	6.8	7.4	7.9	8.5
6	4.7	5.3	6.0	6.6	7.3	7.9	8.6	9.2	9.9
5	5.6	6.4	7.2	7.9	8.7	9.5	10.3	11.1	11.8
4	7.0	7.9	8.9	9.9	10.9	11.8	12.8	13.8	14.8

Table 4. Economic thresholds for first-generation bean leaf beetles (average number of beetles per 20 sweeps).

	Management Cost ($/acre)								
$/bu	7	8	9	10	11	12	13	14	15
15	8.1	9.2	10.2	11.3	12.4	13.4	14.5	15.6	16.6
14	8.6	9.8	10.9	12.1	13.2	14.3	15.5	16.6	17.8
13	9.2	10.5	11.7	12.9	14.2	15.4	16.6	17.9	19.1
12	10.0	11.3	12.6	14.0	15.3	16.6	18.0	19.3	20.6
11	10.8	12.3	13.7	15.2	16.6	18.1	19.5	21.0	22.4
10	11.8	13.4	15.0	16.6	18.2	19.8	21.4	23.0	24.6
9	13.1	14.8	16.6	18.4	20.2	22.0	23.7	25.5	27.3
8	14.6	16.6	18.6	20.6	22.6	24.6	26.6	28.6	30.6
7	16.6	18.9	21.2	23.5	25.8	28.1	30.3	32.6	34.9
6	19.3	22.0	24.6	27.3	30.0	32.6	35.3	38.0	40.6
5	23.0	26.2	29.4	32.6	35.8	39.0	42.2	45.4	48.6
4	28.6	32.6	36.6	40.6	44.6	48.6	52.6	56.6	60.6

The new management concept is to sample the first-generation beetles and then to use this information to manage the second-generation beetles. Here is how it works:

- Determine what week your soybean plants emerged from the soil.
- From Table 2 (left-hand column), find the dates that match your soybean emergence date.
- Determine which of the five Iowa locations is closest to your field. Where the date (row) and location (column) intersect represents the predicted date for peak first-generation beetle emergence.
- Sample your soybean fields 1 week after the predicted peak emergence. If the number of beetles reaches or exceeds the threshold (Table 3 or 4), stop sampling. If the sample is below the threshold, sample the following week. If the sample remains below the threshold, sample a third and final week. If the threshold is not reached, an economic infestation of bean leaf beetles should not occur in your pod-stage soybean.
- If the first-generation population is above the threshold, do not spray now, but scout the fields again in late August to monitor for the first emerging beetles of the second generation. When the first beetles occur, spray the field with an

insecticide (45-day preharvest interval or less). Based upon the population size of the first generation, it is expected that the second generation will exceed the economic threshold. Fields can be sampled for first-generation beetles by using either a drop cloth or a sweep net.

Drop cloth

- Walk 100 feet in from the field edge and scout each field and each variety separately.
- Place a 3-foot-wide strip of cloth on ground between the rows.
- Bend the plants on one row over the cloth, and shake them vigorously.
- Count the number of beetles on the cloth.
- Repeat the procedure four times for each 20 acres of the field.
- Determine the average number of beetles per 3 foot of row.
- See Table 3 for the number of beetles per 3 foot of row necessary to justify insecticide treatment for the second-generation adults in August or September.
- If the number of beetles is below the economic threshold, sample your fields again the following week, or a third week if necessary.

Sweep net

- Walk 100 feet in from the field edge and scout each field and each variety separately.
- Take 20 sweeps.
- Repeat the procedure four times for each 20 acres of the field.
- Determine the average number of beetles per 20 sweeps.
- Table 4 shows the number of beetles per 20 sweeps that justifies insecticide treatment for the second-generation adults.
- If the number of beetles is below the economic threshold, sample your fields again on following week, or a third week if necessary.

Plant Diseases

Soybean iron chlorosis in some fields

by XB Yang, Department of Plant Pathology

Soybean was planted later this year than in the past 2 years and this late planting has resulted in reduced seedling disease pressure. Recently, however, iron chlorosis has been detected in some fields in central Iowa.

For soybean planted in early May, iron chlorosis generally occurs in mid- to late June. This disease is pronounced during growing seasons with cool temperatures and excessive moisture. Early this summer, the weather was cool with little moisture and thus not very favorable for iron chlorosis development. Iron chlorosis this season will probably be field- or site-specific.

In fields that have high pH (greater than 7), patches of soybean may turn yellow in wet areas. Normally, iorn chlorosis would first be observed in spots where the water table is high and drainage is poor. Symptoms of iron chlorosis are yellowing of interveinal area of young leaves. Brown and necrotic spots may occur in leaf margins, and plants can be stressed or killed if the disease is severe.

Fungal root rot often is associated with iron chlorosis and root rot symptoms catch people's attention first during diagnosis. Samples of iron chlorosis often have discoloration of tap roots (dark brown or reddish brown discoloration). Different

Iron chlorosis with root rot.

fungi can be isolated from these plants with *Fusarium* species the most common. In this type of root rot, fungal infection is not a primary damaging factor because soybean is more vulnerable to fungal infection when plants are weakened by iron deficiency. Fungal infections can compound the damage caused by iron chlorosis.

Plant diseases are usually caused by infectious fungi, viruses, or bacteria. However, iron chlorosis is a disease, too, but it is caused by none of these organisms. It is a physiological disease, called a noninfectious disease, and a major disease in central and northern Iowa. In soybean fields, there is plenty of iron in soils. But iron becomes unavailable to soybean when soil pH is high, resulting in iron deficiency.

If this disease is a problem in your fields, consider the following management options for the next growing season: 1) variety selection and 2) planting and cultivation options. Varieties are different in tolerance to iron chlorosis. Some varieties are tolerant to the disease and yield much better in fields with higher pH. Consider planting in warm, less wet soil to reduce the incidence of this disease. If root rot is severe, cultivation may help promote root growth.

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

Announcements

New soybean rust fact sheet

by XB Yang, Department of Plant Pathology

A new fact sheet on soybean rust called, Soybean rust: *Phakopsora packyrhizi* and *P. meibomiae*, discusses how to identify the disease and handle soybean plants suspected of having rust infection. Specific topics include distribution and transmission, host range, symptoms and disease development, identification of soybean rust, sample collection procedures, sample submission, and management recommendations.

This 2-page fact sheet is a part of national pest alert effort following the arrival of Asian soybean rust in South America. The fact sheet can be obtained free from the ISU Extension Distribution Center by calling (515) 294-5247. Ask for EDC 296.

The fact sheet was produced by the USDA-CSREES Integrated Pest Management Centers, National Plant Diagnostic Network, APHIS, and ARS.

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

Insects and Mites

Time for second insecticide spray for bean leaf beetles and bean pod mottle virus

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

In our article in the April 28 issue of *Integrated Crop Management* (page53), we presented a flow chart for making management decisions for bean leaf beetles and bean pod mottle virus. For the left side of the flow chart, the following now applies. If you are managing your soybean for bean pod mottle virus, start scouting this week and next for first-generation adult bean leaf beetles. Look for soft, slightly gray-colored adults (these are the newly emerged, first-generation beetles) in your field. According to our flow chart, the presence of these beetles means it is time to spray your second insecticide application. More information on the progress of the first-generation bean leaf beetles will be presented in future issues of this newsletter.

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.

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Degree Days

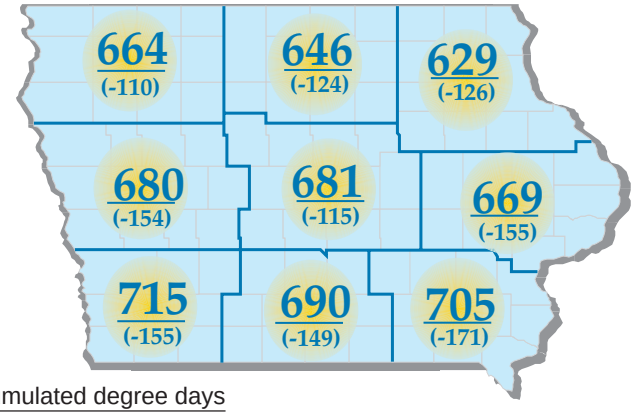
A week full of progress

by Rich Pope, Department of Entomology

The week of June 16 through June 23 provided great crop growing opportunities across Iowa. Spraying for postemergence weed control began in Roundup-Ready¨ soybean the last week of June. Alfalfa fields are enduring considerable potato leafhopper feeding in most of Iowa, and pea aphids were noticed in northeastern Iowa alfalfa. A nice rain would be welcome statewide.

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 22, 2003



accumulated degree days
(departure from average)

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