Soybean Aphids in Iowa—2006

Marlin E. Rice
Iowa State University, merice@iastate.edu

Matthew E. O'Neal
Iowa State University, oneal@iastate.edu

Palle Pedersen
Iowa State University

Follow this and additional works at: http://lib.dr.iastate.edu/extension_ag_pubs
Part of the Agricultural Education Commons, and the Entomology Commons

Recommended Citation
http://lib.dr.iastate.edu/extension_ag_pubs/88

Iowa State University Extension and Outreach publications in the Iowa State University Digital Repository are made available for historical purposes only. Users are hereby notified that the content may be inaccurate, out of date, incomplete and/or may not meet the needs and requirements of the user. Users should make their own assessment of the information and whether it is suitable for their intended purpose. For current publications and information from Iowa State University Extension and Outreach, please visit http://www.extension.iastate.edu.
Soybean Aphids in Iowa—2006
by Marlin E. Rice, Matt O’Neal, and Palle Pedersen

**THE SOYBEAN APHID** (Aphis glycines) can be a major pest for soybean growers in Iowa. In 2003 aphid populations exceeded 3,000 aphids per plant in many fields. During this year, Iowa soybean yields averaged 32 bushels per acre—a 16 bushel per acre (or a 32%) reduction from 2002. This yield reduction was partly due to the soybean aphid coupled with drought conditions. Approximately 2.9 million acres in Iowa were sprayed with insecticides to reduce these damaging populations, and a survey of 2,400 Iowa farmers indicated that yield losses reached 57.7 million bushels of soybeans. However, in 2004 only 50,000 acres were treated for soybean aphids because of very low aphid populations.

During any growing season, the soybean aphid remains a threat to cause economic damage to soybeans. This publication reviews what is currently known about soybean aphids and management strategies for 2006.

**Origin of Soybean Aphid**
The soybean aphid is native to eastern Asia, including China, Indonesia, and Japan, where it is an infrequent pest of soybeans. It was first detected in North America in Wisconsin in July 2000 and now occurs throughout all Midwestern soybean production states. It is not known how this insect entered the United States, but historical records of other aphid interceptions by the U.S. Department of Agriculture suggest that the soybean aphid most likely arrived from Asia, either carried by an international airline passenger or associated with horticultural cargo.

**Distribution in Iowa**
Since its discovery in northeastern Iowa in August 2000, the soybean aphid quickly spread across Iowa. Twelve months later, the aphid was detected in western Iowa in Woodbury County, and within two years, the aphid had been found in soybeans in every Iowa county.

**Description of Soybean Aphid**
The soybean aphid is the only aphid in North America that will reproduce on soybeans. Therefore, any cluster of aphids found on soybeans must be soybean aphids. There are both wingless and winged forms. Wingless soybean aphid adults are about $\frac{1}{16}$ inch in length, pale yellow or green, and have dark-tipped cornicles (tail pipes) near the end of the abdomen.

Soybean aphids will colonize the upper stem and newly developing leaves on soybeans. (Marlin E. Rice)

Winged and wingless soybean aphids on a soybean leaflet. (David Voegtlin)
The winged form has a shiny black head and thorax with a dark green abdomen and black cornicles. Aphids feed through piercing-sucking mouthparts.

**Biology and Seasonal Cycle**

The seasonal cycle of soybean aphids is complex. Eggs are laid on buckthorn in the fall, overwinter there, and hatch in the spring, giving rise to wingless females. These wingless females on buckthorn reproduce without mating (asexually), and the young develop into winged females that migrate in search of soybean or possibly other host plants. There may be up to four generations on buckthorn in the spring. Females on soybean reproduce without mating and produce wingless daughters that continue the cycle. During the summer, winged aphids may develop during any generation on soybean, which puts much of Iowa soybean at risk because the aphids are easily carried by winds to areas even where the aphid may not have overwintered locally.

The soybean aphid may have 15 to 18 generations on soybean plants annually. Soybean aphid reproduction is affected by temperature. The optimum temperatures for reproduction and longevity are 72 to 77 °F with the relative humidity below 78 percent. Under optimum conditions maintained in a laboratory environment, soybean aphids have the potential to double their populations within 2 to 3 days. Field-based estimates of aphid population growth suggest that doubling time is about 5\( \frac{1}{2} \) days. When temperatures exceed 81 °F the developmental time is lengthened. A temperature-based forecast is available on the World Wide Web (see “Additional Information” on page 13). Note that this forecast is based on models using estimates of soybean aphid growth from laboratory-based conditions.

In late summer, the wingless females produce young that develop into both winged females and males. These winged aphids migrate back to buckthorn, where they reproduce sexually. These mated females subsequently lay eggs, beginning a new seasonal cycle that passes through the winter.

The first detection of soybean aphids in Iowa has typically occurred near Decorah in northeastern Iowa on seedling soybean plants (V1–V2 stage) during early to mid-June. In 2006, the first soybean aphids were found on May 31 near Ames.
Host Plants
The primary host is a small woody tree called buckthorn (*Rhamnus cathartica* and *Rhamnus alnifolia*). Soybean aphids prefer seedling or sapling trees on which to lay their eggs in the fall. Eliminating buckthorn might seem to be a logical approach to reducing soybean aphid populations, but this is impractical. Buckthorn grows widely across Iowa in wooded areas and river bottoms and has been planted in shelterbelts as windbreaks. If all the buckthorn in a county could be eliminated, winged aphids could still fly in from other counties to infest soybean fields.

Soybean is a secondary host because the aphids do not reproduce sexually on this plant. Additional secondary hosts include crimson clover and red clover. These are excellent hosts for soybean aphids and will support high levels of aphid reproduction. To a lesser extent, berseem clover and kura clover will support aphid reproduction, while white clover, white sweet clover, and yellow sweet clover can support low levels of reproduction, but they are extremely poor hosts for the soybean aphid.

Injury Symptoms in Soybean
Soybean aphids may distort soybean leaves and heavily infested plants may have yellow leaves. Honeydew, a sticky and shiny liquid excreted by the aphids as a by-product from ingesting large amounts of plant juices, accumulates on the top surface of leaves. Excessive honeydew permits the growth of sooty mold, turning the leaves dark and interfering with photosynthesis in the plant. Heavily infested plants may be stunted. Plants that become stunted during the early reproductive growth stages of soybean may have reduced pod set and seed counts, resulting in lower yields.

Feeding by soybean aphids causes flowers and small pods to abort, reducing the number of pods per plant. Feeding also competes with the soybean plant for nutrients, which reduces the number of soybeans per pod and, less frequently, the size of soybeans.

Therefore, protecting plants during the flowering stages (R1–R2) and green-bean pod stages (R5–R6) helps protect soybean yield. These soybean stages typically occur from mid-July into early August in Iowa.

Transmission of Viruses
The soybean aphid can transmit several viruses, including alfalfa mosaic virus, bean yellow mosaic virus, and soybean mosaic virus. The soybean aphid is an efficient transmitter of soybean mosaic virus, requiring only 5 to 30 minutes of feeding time for efficient transmission. Soybean mosaic virus is of primary concern in Iowa because it can cause significant yield loss, although this has not yet been documented in the state.
This virus may be more important when it occurs in plants that also are infected with bean pod mottle virus that is transmitted by the bean leaf beetle. Plant-expressed symptoms of these two viruses are similar and cannot be separated visually from each other in the field.

**Natural Enemies of Soybean Aphids**

Lady beetles (especially the multicolored Asian lady beetle), green lacewings, insidious flower bugs, and other beneficial insects occur in Iowa soybean fields and will eat aphids. The multicolored Asian lady beetle is capable of eating as many as 200 soybean aphids a day. These predators probably can suppress soybean aphid population growth in June and early July when fields have small aphid populations. Once aphids fully infest a field (80% or more of plants with aphids) and populations reach 100 to 200 aphids per plant, the impact of these predators is limited and populations are likely to increase.

Fungal pathogens also reduce soybean aphid populations. A fungal epidemic was observed in Wisconsin in 2000 and was believed partly responsible for the decline in late-season aphid densities.

When aphids are found, estimate the population size per plant. Count all the aphids on several leaves and plant terminal to establish what 100 or 250 aphids look like and then use this as a mental reference for gauging populations on other plants.

A quicker scouting method, called speed scouting, has been developed at the University of Minnesota (see resource listings on page 13). This method uses the number of infested plants as a guide for determining whether an insecticide application is justified. This is not a new threshold, but rather a sampling tool that helps determine if the soybean aphid population within a field is above the 250 aphid per plant threshold (see “Economic Threshold” section on page 8).

**Scouting Recommendations**

Scouting must be conducted to determine aphid presence and abundance. Begin scouting for soybean aphids the last week of June, especially in northeastern Iowa. Check the upper two or three trifoliolate leaves and stem for aphids. Aphids are most likely to concentrate in the plant terminal. Scout five locations per 20 acres. Also, look for ants or lady beetles on the soybean plant—they are good indicators of the presence of aphids. Lady beetles feed on aphids while ants tend the aphids and “milk” them for honeydew. Field scouting should occur weekly until plants reach the mid-seed stage (R5.5) or the field is sprayed.
Large colonies of soybean aphids contain several thousand individuals per leaflet. (Marlin E. Rice)

Soybean aphids are often associated with ants. The ants benefit from the relationship by feeding on the honeydew excreted by the aphids. It is thought that the aphids also benefit, as the ants may provide some protection from insect predators. The presence of ants may help in scouting for aphids, especially early in the growing season when aphid infestations have yet to reach large numbers. (Marlin E. Rice)

In general, speed scouting made the same treatment decision as whole-plant counts 82 percent of the time; the remaining 28 percent were situations where whole plant counts indicated that the field did not require an insecticide application, but speed scouting suggested that an insecticide application was required. In our test in Iowa, speed scouting appears to be a more conservative sampling plan since the decision to apply an insecticide often occurred before aphid densities exceeding the economic threshold. Regardless of sampling method, soybean aphid management should rely on multiple samples over time to assess population growth rates to avoid unnecessary foliar applications.

**Year-to-Year Population Variation**

The soybean aphid has been in Iowa since late summer 2000. During that time, the overall population has gone through dramatic high and low cycles. These cycles have included high populations (>2,000 aphids/plant) in 2001 and 2003, followed by very low populations (<250 aphids/plant) in 2002 and 2004. This phenomenon is not limited to Iowa but has been observed across the Midwest.

In 2005, small plot trials were conducted at multiple locations in three states within the North Central Region of the United States (Iowa, Minnesota, and Wisconsin). Results indicated no significant yield difference when using speed scouting compared to whole-plant counts based on an economic threshold of 250 aphids per plant.

Our understanding of this insect is still incomplete, and it would be premature to state that the soybean aphid population oscillates through predictable high and low cycles. However, an analysis of trap capture data from the Illinois Natural History Survey may provide some insight into these high and low cycles. Winged soybean aphids were collected in 20-foot-tall suction traps placed across Illinois at nine locations. Flying soybean aphids
were trapped as they flew between soybean fields during the summer and then in the early fall as they migrated back to buckthorn.

In high aphid years like 2003, large numbers of winged aphids were collected in the suction traps during July and August, when aphids are present in soybean fields. By the end of August, the capture of winged aphids dropped off dramatically. Very few, if any, male and female winged aphids were collected in the early fall. This represents the sexually reproducing aphids that lay the overwintering eggs. Low numbers of overwintering eggs may lead to low numbers of aphids colonizing soybean fields in the spring and early summer. In contrast, for low aphid years like 2004, very small numbers of winged aphids were collected in the suction traps during July and August. However, unlike 2003, significantly more aphids (nearly 40 times more) in the fall were collected in the traps from early September through early October. These high winged aphid captures in the fall indicate that large numbers of eggs were probably laid on buckthorn.

The interactions of factors responsible for these wide population swings are not well known. Environmental conditions, such as strong rainstorms in early summer, can knock down populations while long periods of dry weather during July and August can facilitate population growth. Predators, such as the multicolored Asian lady beetle, feed on aphids during the summer and eggs on buckthorn in the fall. This predation on eggs may significantly reduce the soybean aphid population the following spring and be partly responsible for the population cycles during the last four years.

Prediction for 2006
Information about the year-to-year variability of soybean aphids in North America comes from a network of suction traps, and this information is available on the World Wide Web (see “Additional Information” on page 13. David Voegtlin, an aphid specialist at the Illinois Natural History Survey, established the network in 2001 soon after soybean aphids were first reported in North America. The suction traps collect migratory aphids as they are flying from May through October. During the early stages of the soybean aphids' invasion of North America, Voegtlin was reporting a remarkable trend (Figure 1). In general, more soybean aphids were caught in suction traps during the fall before a growing season when outbreaks were common (several thousand per plant) during July and August (2003, 2005). This is interesting because soybean aphids make migratory flights during the fall to buckthorn, their overwintering host. Curiously, during the fall of those outbreak years, very few, if any, aphids were collected. Based on this trend, it has been suggested that the fall flight may help predict the potential for outbreaks in the coming growing season.

In 2005 we established four suction traps in Iowa (Figure 2). Without historical data like that from Illinois, it is hard to know what our first year of suction trap data in Iowa indicates. However, the amount of winged aphids caught in the fall suggests that a significant number of
soybean aphids were immigrating back to buckthorn in the fall of 2005. Given this, it is likely that growers will experience soybean outbreaks in 2006.

If you are looking for further information, visit [www.ncipmc.org/traps](http://www.ncipmc.org/traps). This site has the 2005 data for all states with a link to each individual suction trap, and for 2006, weekly updates began in May.

Figure 1. Five-year trend in fall flight of soybean aphids from nine suction traps in Illinois sampled during the fall flight associated with soybean aphid migration to buckthorn, its overwintering host.

Figure 2. Regional summary of suction trap data from 2005 across six states. Traps were deployed for the first time in all states but Illinois, with traps from mid-July to the end of October. The number of traps varied by state. Note that in Iowa (light blue), traps captured soybean aphids in September, indicating potential immigration to buckthorn, the overwintering host. In contrast, there were no aphids caught in suction traps in Michigan (dark blue) during September or October, despite the thousands caught during August.

One of four suction traps set up in Iowa in 2005 for soybean aphid sampling. The traps are approximately 25 feet tall to collect winged aphids that are migrating from buckthorn to soybean and back. At this size, the traps are unlikely to collect aphids that fly from one soybean plant to another. Traps will be run from May through October during the 2006 growing season.
Management Considerations
Do not use insecticides when small populations of soybean aphids are first found in the field. Natural enemies may help suppress small aphid populations. Determine if the aphid population is increasing or decreasing. Conditions that favor an increase in aphids are:

- plants under drought stress,
- potassium deficient soils,
- cool temperatures, and
- absence of beneficial insects.

Take special note of winged aphids or “broad-shouldered” nymphs that are beginning to develop wings and are nearing the adult stage. If most of the aphids are winged or nearing this stage, they will leave the plant, or maybe the field, and an insecticide may not be needed because the population will rapidly decline. Check for parasitized aphids (called mummies). Do not spray the field if a majority of the aphids have turned to mummies.

Economic Threshold
Two concepts are very important in integrated pest management for understanding pest and yield loss relationships. These are the economic injury level and the economic threshold. The economic injury level is the lowest number of insects that will cause economic damage; i.e., yield loss that equals the cost of control. In 2003, a preliminary economic injury level of 1,000 per plant was reported based on research from the University of Minnesota. Since then, data from additional states, including Iowa, have refined both with the economic injury level at 654 aphids per plant during the R1–R5 growth stages for 30⁰-row soybeans. The economic threshold is a similar concept, but it is the pest density at which management action should be taken to prevent an increasing pest population from reaching the economic injury level.

Data from multiple states over several years suggest that the economic threshold is approximately 250 aphids per plant.

The economic threshold of 250 aphids per plant is the number that should be used to justify an insecticide application to a soybean field. This economic threshold incorporates a 5- to 7-day lead time before the aphid population would be expected to exceed the economic injury level—and cause economic damage. Populations that average less than 250 aphids per plant should not be sprayed.

Fields with small aphid populations should be scouted every 2 to 3 days to determine if they reach the economic threshold. Heavy rains and beneficial insects may reduce low or moderate populations.
Insecticides are most likely the only option for control once the population reaches the economic threshold. Control aphid populations before the symptoms of heavy honeydew, sooty mold, and stunted plants appear in the field. An insecticide may still be of value after these conditions occur, but the optimum time for treatment has passed. The benefit of any insecticide application will be greatly reduced after soybeans reach the R5.5 growth stage.

**Insecticide Considerations**

**Insecticide timing.** Insecticide applications made during the early soybean reproductive stages (R1–R4) have shown larger and more consistent yield protection than applications made later in the growing season. On-farm strip-trial data from several Midwestern states in 2003 showed that fields sprayed in early August had larger yield gains than fields sprayed in mid-August. For each day delay in spraying during 2003 after August 1, an average of 0.5–0.6 bushel was lost daily. Fields sprayed in late August and early September often showed no yield response to the insecticide application because most of the aphid damage had occurred by this time. In contrast, in northeastern Iowa in 2002, aphid populations increased earlier in the season, and some fields sprayed twice during mid- and late July benefited from both treatments in significant yield increases.

Plants heavily infested with soybean aphids can become stunted and dark from sooty mold. (Marlin E. Rice)
**Insecticide evaluation.** In 2005, we selected several foliar insecticides for evaluation of their capacity to manage soybean aphids (see table), including insecticides applied directly to the seed. This experiment was planted on 22 May, and foliar insecticides were applied on 2 August, when aphids reached approximately 200 aphids per plant. In general, foliar-applied insecticides provided the best protection against soybean aphids (Figure 3) with little difference between insecticides of either the organophosphate or pyrethroid chemical classes. In terms of yield protection, foliar-applied insecticides had the highest yields with no difference among the organophosphate or pyrethroid insecticides (Figure 4). There was limited yield protection from insecticide-treated soybean seeds that did not receive a foliar insecticide.

**Insecticides labeled for soybean aphids, including products tested in 2005 soybean aphid efficacy trials.**

<table>
<thead>
<tr>
<th>Product</th>
<th>Formulation</th>
<th>Active Ingredient</th>
<th>Chemical Class</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lorsban*</td>
<td>4E</td>
<td>chlorpyrifos</td>
<td>organophosphate</td>
<td>16 fl oz/acre</td>
</tr>
<tr>
<td>Proaxis</td>
<td>0.5 E</td>
<td>gamma-cyhalothrin</td>
<td>pyrethroid</td>
<td>3.2 fl oz/acre</td>
</tr>
<tr>
<td>Decis</td>
<td>1.5E</td>
<td>deltamethrin</td>
<td>pyrethroid</td>
<td>1.9 fl oz/acre</td>
</tr>
<tr>
<td>Lorsban +</td>
<td>4E</td>
<td>chlorpyrifos</td>
<td>Tank-mix</td>
<td>16 fl oz/acre</td>
</tr>
<tr>
<td>Baythroid*</td>
<td>2E</td>
<td>cyfluthrin</td>
<td>(see individual entries)</td>
<td>2 fl oz/acre</td>
</tr>
<tr>
<td>Warrior*</td>
<td>1 SC</td>
<td>lambda-cyhalothrin</td>
<td>pyrethroid</td>
<td>3.2 fl oz/acre</td>
</tr>
<tr>
<td>Baythroid*</td>
<td>2E</td>
<td>cyfluthrin</td>
<td>pyrethroid</td>
<td>2.8 fl oz/acre</td>
</tr>
<tr>
<td>Fulfill1,2</td>
<td>50WG</td>
<td>pymetrozine</td>
<td>NA</td>
<td>2.3 fl oz/acre</td>
</tr>
<tr>
<td>Trimax1,2</td>
<td>4 E</td>
<td>imidacloprid</td>
<td>neonicotinoid</td>
<td>1.5 fl oz/acre</td>
</tr>
<tr>
<td>Cruiser1,3</td>
<td>5 FS</td>
<td>thiamethoxam</td>
<td>neonicotinoid</td>
<td>100 g/100 kg seed</td>
</tr>
<tr>
<td>Cruiser1,3</td>
<td>5 FS</td>
<td>thiamethoxam</td>
<td>neonicotinoid</td>
<td>50 g/100 kg seed</td>
</tr>
<tr>
<td>Gaucho1,3</td>
<td>400 F</td>
<td>imidacloprid</td>
<td>neonicotinoid</td>
<td>62.5 g/100 kg seed</td>
</tr>
<tr>
<td>Asana*</td>
<td>XL</td>
<td>esfenvalerate</td>
<td>pyrethroid</td>
<td>5.8–9.6 fl oz/acre</td>
</tr>
<tr>
<td>Mustang Max*</td>
<td></td>
<td>zeta-cypermethrin</td>
<td>pyrethroid</td>
<td>2.8–4 fl oz/acre</td>
</tr>
<tr>
<td>Nufos*</td>
<td>4E</td>
<td>chlorpyrifos</td>
<td>organophosphate</td>
<td>1–3 pints</td>
</tr>
<tr>
<td>Penncap*</td>
<td>M</td>
<td>methyl parathion</td>
<td>organophosphate</td>
<td>3.2–3.84 fl oz/acre</td>
</tr>
</tbody>
</table>

*Restricted-use insecticide
1Products were tested in replicated strip trials in Floyd County (Figures 3 and 4).
2Fulfill and Trimax are not labeled for use on soybeans in Iowa.
3Rate of seed treatments is given as grams product/kilogram seed (1 kg = 2.4 lbs).
Figure 3. Impact of different insecticides on the soybean aphid populations. Soybeans were planted on 22 May and foliar insecticides were applied on 2 August. The untreated plots are denoted with a solid black line, seed treatments with dotted lines, and thin-colored lines are used for the eight foliar-applied insecticides.

Figure 4. Impact of different insecticides grouped by mode of action on soybean yield. Foliar insecticides were applied on 2 August 2005. Means labeled with a unique letter were significantly different ($P = 0.05$).

*Lorsban + Baythroid is a tank mix consisting of an organophosphate (Lorsban) and a pyrethroid (Baythroid).
Our 2005 insecticide evaluations suggest that organophosphates and pyrethroids vary little in their ability to protect soybeans from soybean aphids. However, there may be conditions that favor one class over another.

- **Warrior®,** a pyrethroid insecticide, has provided consistent control among the pyrethroids in many university insecticide trials. Pyrethroid insecticide performance is enhanced during cool temperatures. Under dry conditions, growers are discouraged from using pyrethroids as these tend to favor spider mites.

- **Lorsban®,** an organophosphate insecticide, exhibits a vapor action, especially during high temperatures. This can improve coverage in tall plant canopies or narrow-row or drilled soybeans. Although organophosphates have activity against adult spider mites, users should be aware that there is limited activity against spider mite eggs. Fields should be scouted after application (3+ days) to ensure sufficient spider mite control. As always, follow label guidelines for appropriate use.

If an insecticide is sprayed, a small, unsprayed test strip left in the field will help to determine the real value and performance of the insecticide treatment. The soybean aphid appears to rebound from some insecticides and a high level (98%) of control is desired. High water volume, high pressure, and a nozzle that produces a small droplet size also have been suggested as ways to improve soybean aphid control, especially in fields with a dense plant canopy.

**Seed treatments.** Thiamethoxam (Cruiser®) and imidacloprid (Gaucho®) are labeled for use in soybeans. These are commercially applied to the seed before planting and are both members of the neonicotinoid insecticide class. These insecticides are systemic, meaning that they are absorbed into the plants and have a tendency to concentrate in the actively growing areas on the plant (new leaves and root tips). When soybean aphids feed on the plant, they ingest the insecticide.

Testing of these products across the Midwest has shown performance against soybean aphids in the early vegetative growth stages. However, both products have limited residual activity to protect older, reproductive stage plants (see Figures 1 and 2).

**Tank mixing insecticides with herbicides.** Tank mixing an aphid insecticide with a glyphosate application for weed control in glyphosate-resistant soybeans seems like a logical approach to reduce costs. However, it is impractical because of timing and application issues. The optimum time for controlling soybean aphids has been between mid- to late July and early August; the optimum time for glyphosate in soybean is when the weeds are less than four inches tall, which is most likely to be in June.

Insecticides applied in June do not have residual activity long enough to significantly suppress later soybean aphids. Also, early season insecticide applications may backf**lash by reducing the numbers of natural enemies that help suppress aphid populations.

The application of an insecticide/herbicide tank mix presents additional problems. Glyphosate is typically applied with decreased pressure and large droplet size to prevent drift problems. Research conducted at Iowa State University shows that under such conditions, the insecticide performance is decreased—more aphids remain on the plants than if they were sprayed with higher pressure, more water volume, and smaller droplets. Given these concerns, we recommend growers avoid tank mixing an insecticide and herbicide for application during June.

**Tank mixing insecticides with fungicides.** The potential arrival of Asian soybean rust in Iowa has increased interest in fungicide applications to soybeans. The timing and application method of fungicides against soybean rust may overlap with the management of soybean aphids. Like insecticides, fungicides require complete plant coverage and are applied at high pressure and small droplet size. Currently, there are no known adverse interactions between fungicides labeled for use against soybean rust and insecticides labeled for soybean aphid. However, many fungicides are toxic to fungi...
that attack aphids, and their use could lead to an increasing aphid population. Currently registered soybean fungicides (Bravo®, Bumper®, Folicur®, Headline®, Laredo®, Quadris®, Propimax®, Stratego®, and Tilt®) used in the laboratory have reduced the infectivity of fungi that kill aphids by 28 to 100 percent. Farmers who apply fungicides for soybean rust control should closely monitor aphid populations in their fields.

Preventive Tactics
In addition to insecticides, some preventive tactics may help reduce aphid problems. Early planting was thought to allow soybeans to escape or delay aphid population buildup and virus disease. However, results have been inconsistent. Additionally, early planting encourages bean leaf beetle colonization and subsequent bean pod mottle virus infection, so adjusting planting date should be considered carefully before implementation.

Planting seed of resistant plants may also be an option for future management programs. Although resistant plants have been identified for some commercial sources based on laboratory testing, these varieties have yet to be tested for aphid resistance in the field. However, several species of wild perennial soybeans highly resistant to both the soybean aphid and soybean mosaic virus have been found. The germplasm from these highly resistant accessions is being incorporated into ongoing soybean breeding programs and will play a more important role in future pest management efforts.

Prognosis for Iowa
The soybean aphid is firmly established as a pest of soybean in Iowa. After a brief five years of experience with the pest and observing its damage potential, it would seem reasonable to expect economic damage to occur somewhere in Iowa every year. The damage is likely to be greater during years when drought and other stresses occur in soybeans. Preemptive field scouting and the timely application of control measures when the aphid population reaches the economic threshold are necessary steps to successfully manage the insect and prevent economic damage.

Additional Information
For more information on soybean aphids, consult the Web site www.soybeanaphid.info or, in Iowa, contact Marlin Rice at 515-294-1101.

Additional information mentioned in this publication:
- Speed sampling for aphids
  www.soybeans.umn.edu/crop/insects/aphid/aphid_sampling.htm
- Aphid estimator (provides a temperature-based estimate of population growth)
  www.soybeans.umn.edu/crop/insects/aphid/aphid_sagemodel.htm
- Suction trap network (current and archived data, from 2001)
  www.ipm.uiuc.edu/fieldcrops/insects/soybean_aphids/suction_trap_network/index.html
Acknowledgments

Information in this publication was partly provided by the following people: Brian Lang (Iowa State University), Ken Ostlie (University of Minnesota), Carol Pilcher (Iowa State University), David Ragsdale (University of Minnesota), Alison Robertson (Iowa State University), Rob Venette (University of Minnesota), and David Voegtlin (Illinois Natural History Survey). Their contributions to this publication and our understanding of the soybean aphid are greatly appreciated.

The financial assistance of the Iowa Soybean Association in supporting soybean aphid research in Iowa is gratefully acknowledged.

Marlin E. Rice is a professor with extension and research responsibilities in the Department of Entomology; Matt O’Neal is an assistant professor with research responsibilities in the Department of Entomology; and Palle Pedersen is an assistant professor with extension and research responsibilities in the Department of Agronomy.

Pest Management 2-5

... and justice for all

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Many materials can be made available in alternative formats for ADA clients. To file a complaint of discrimination, write USDA, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964.