Illinois Soybean Pathology and Entomology Research

Soybean Aphid

In cooperation with University of Illinois Extension

The soybean aphid (*Aphis glycines*) is a new pest of soybean in the Midwest. It is native to China, Japan, Korea, and southern Asia. Since 2000, it has been found throughout the soybean growing areas of Illinois and the surrounding states.

Description and Life Cycle

Soybean aphids are small (~ 1/16 inch), greenish-yellow insects with distinct black cornicles, or "tailpipes," on their abdomens. On actively growing soybean plants, colonies are found on the stem apices and young leaves; on reproductive-stage soybeans, the aphids are found on the undersides of the leaves, and on stems and pods throughout the plant. It is rare to find any other species colonizing soybeans in North America, so it is safe to assume that colonies of tiny, yellow aphids on soybeans are the soybean aphid.

Many aphids on soybean leaves. Some leaves are discolored by sooty mold growing on honeydew excreted by the aphids. Photograph by Marlin E. Rice.
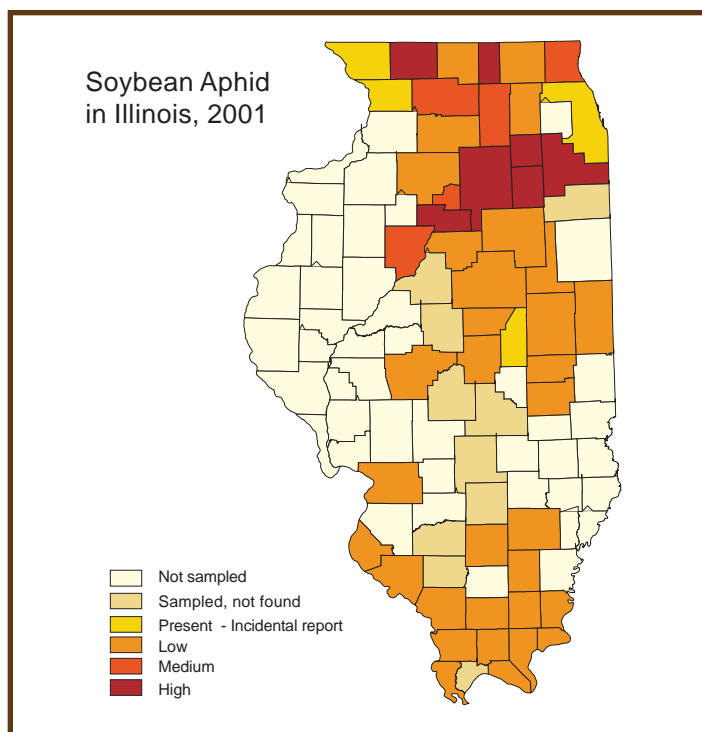
Ants and lady beetles are attracted to colonies of aphids on soybeans. They are larger and more easily seen than the aphids and may help locate aphid colonies. Sooty mold also develops on the honeydew that the aphids excrete, causing heavily infested plants to appear dirty.

Aphid populations have the potential to increase 10-fold every week. However, if crowding on stressed plants occurs, winged aphids (~1/8 inch) develop and fly away from the field in search of other soybean fields to colonize. This dispersal from a field may cause the population within that field to decline drastically.

The soybean aphid has a complex life cycle with as many as 18 generations annually. Two different host plants are required by the aphid. The aphid spends the winter on buckthorn plants (*Rhamnus*) as eggs. Nymphs hatch in the spring, and after a few generations on buckthorn, winged females fly in search of soybean plants. The aphids pass through a series of wingless and winged generations on soybean during the summer. In September, winged aphids migrate to buckthorn plants to complete their annual life cycle.

Distribution

During 2000 and 2001, the heaviest infestations of soybean aphids were observed in north central and northeastern counties. The aphid spends the winters on buckthorn shrubs and trees along rivers, in hedgerows/windbreaks, and in suburban areas and then moves to soybean fields nearby in June. Buckthorn hosts are more common in northern Illinois than in central and southern Illinois. Some of the heaviest infestations have been observed in late-planted soybean fields.

Soybean Aphid in Illinois, 2001

- Not sampled
- Sampled, not found
- Present - Incidental report
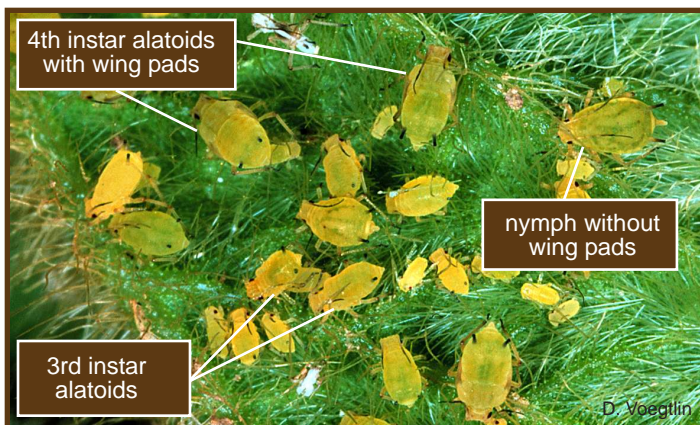- Low
- Medium
- High

Symptoms of Plant Damage

Soybean aphids suck fluids from soybean plants. In studies conducted in Michigan, Minnesota, and Wisconsin, the most important effect of aphid damage on yield was the reduction in the number of soybean pods. Thus, yield may be affected most when soybean aphids attack soybean plants that are flowering or setting pods. Sooty mold, a charcoal-colored residue, typically appears on heavily infested plants. Severely infested plants may be stunted or turn brown and die. The soybean aphid is capable of transmitting several viruses that infect soybean, such as soybean dwarf virus and soybean mosaic virus.

Monitoring

We recommend the following steps for monitoring soybean fields for soybean aphids in Illinois.

1. Determine if your field is in a heavily infested region by referring to articles in the Pest Management & Crop Development Bulletin (www.ag.uiuc.edu/cespubs/pest/) or by accessing the web sites listed below.

2. If you are in a heavily infested region, begin monitoring for aphids when the soybeans have reached late V stages. Monitoring is especially critical by the R1 stage. Late-planted soybeans should be monitored every two weeks starting at the V1 stage.

3. Count the aphids on one leaflet taken from a randomly chosen plant. Pull off a fully-expanded trifoliate leaf near the top of the plant and count the aphids on the middle leaflet. Take leaflets from at least 25 randomly chosen plants, separated by at least 25 paces, and calculate an average number of aphids per leaflet.

4. If the average is 25 or more aphids per leaflet, return to the field in 5 days and resample the same general area to determine if the aphid population is increasing. As described below, many populations do not continue to grow, and some "crash" to very low levels within a week.

5. Use a hand lens or magnifying glass to check as many leaflets as possible for alatoid nymphs that are forming wings. These immature aphids will become winged adults and fly away from the field. These nymphs have broad shoulder (wing) pads (see photo and drawing). If you find that colonies are made up of more than 50% alatoid nymphs, most of the aphids probably will disappear from the field over the next week.

4th instar alatoids with wing pads

nymph without wing pads

3rd instar alatoids

D. Voegtlin

Management Recommendations

The need to treat soybean aphids with an insecticide should be based upon information gathered from regular and thorough scouting procedures. The combination of predators, weather, and aphid biology often cause soybean aphid populations to "crash" within given fields. Therefore, we strongly encourage appropriate assessment of the situation in each field before making a control decision. Consider the following as guidelines for a soybean aphid management program.

Cultivar and planting time
Few of the soybean cultivars that we have screened currently are resistant to the soybean aphid. Check the Varietal Information Program for Soybeans (VIPS) web site (web.aces.uiuc.edu/vips)

for the most up-to-date descriptions of cultivars. Soybean aphid populations do not grow as fast on reproductive-stage soybean plants as they do on vegetative-stage plants. For aphid population management, it is better to plant before June 15.

Natural control
Intense rainfall may kill many aphids by knocking them off the soybean plants. In addition, high humidity increases the potential for fungal organisms to infect soybean aphids.

Naturally occurring predators, parasitoids, and pathogens can suppress soybean aphid populations. Lacewings, predatory bugs, and the multicolored Asian lady beetle are particularly important predators of soybean aphids. For example, each lady beetle can consume several hundred aphids during its lifetime. Thus, if you see one lady beetle on every plant, then biological control may suppress soybean aphid populations effectively.
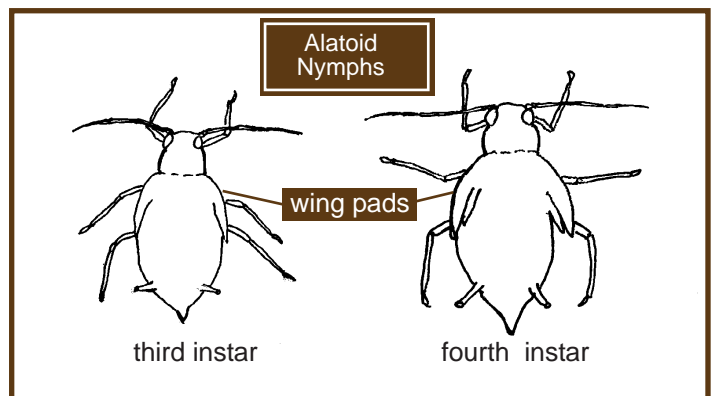
Soybean aphid populations also may decline rapidly because stresses on the crop and crowding by the aphids cause a generation of winged aphids to form. A high percentage of alatoid nymphs (nymphs with "shoulder pads") within a field indicates the forthcoming occurrence of winged adults that will leave in search of other fields.

Insecticide application
Before considering use of an insecticide, determine whether natural enemies or the presence of alatoid nymphs will cause a population "crash" within the week. Also, note that because an aphid population can increase 10-fold in one week, especially without predators to control them, the pest may rebound after an insecticide application to levels similar to those before the application. To protect pod set, sample the aphid population at least twice during late V and early R stages. An application of an approved insecticide may be justified if the following conditions prevail:

· Average density is 25 or more aphids per leaflet.
· Density of aphids increases from first to second sample.
· Alatoid nymphs make up less than 50% of the population.
· Soybean stage is R1 or R2.
Increased application pressure and gallons per acre ensure good coverage and improve efficacy of an insecticide for control of soybean aphids.

Alatoid Nymphs

wing pads

third instar   fourth instar

More Information

University of Illinois IPM web site
www.ipm.uiuc.edu/agriculture/soybeans/aphids.html

Soybean Aphid Watch web site
www.pmcenters.org/Northcentral/Saphid/Aphidindex.htm