

The Soybean Aphid

A New Pest in Kansas Soybeans

The soybean aphid (*Aphis glycines* Matsumura), native of China and Japan, was first identified in the United States during the summer and fall of 2000. By 2001, infestations were confirmed in several Midwestern states from Ohio to West Virginia, and west into Missouri and Iowa. In August and September of 2002, low numbers of aphids were confirmed in five eastern Kansas counties.

The soybean aphid has caused severe damage in some areas of the United States where it has become established. Its recent detection in Kansas means soybean producers in eastern and central Kansas need to learn how to identify this pest and begin to monitor fields for its presence and signs of damage.

Description

The soybean aphid is a small, greenish-yellow aphid with black "tailpipes" or cornicles near the tip of its abdomen. It is the only aphid in North America to develop large colonies on soybeans.

Soybean aphid populations can build up any time from the plant's early vegetative through bloom stages. Initially, most colonies are located at the outer canopy on new leaves. As plants reach maturity, the aphids may move deeper into the canopy, most commonly on the undersides of leaves. Some may be found



Close-up view of soybean aphids on leaf. (Photo by Gregory Zolnerowich, Kansas State University.)

on stems and pods. A second wave of population increase can occur from late August through early September.

Biology and Seasonal Cycle

Soybean aphids spend the winter as eggs on woody shrubs (*Rhamnus* species). Nymphs emerge in the spring and transform into wingless females that feed on shrubs and produce young without mating. Favorable conditions produce winged females that migrate to soybean fields and give birth to young nymphs. During the summer, wingless females develop on the soybeans and reproduce without mating. Late in the summer, a sexual cycle takes place, producing both male and female winged forms. These aphids migrate back to the woody shrubs where females eventually lay eggs that complete the seasonal cycle.

Soybean aphids reportedly reproduce faster in cooler environments (72° to 77°F). Developmental time lengthens when temperatures exceed 81°F. It is possible that hot, dry summers may reduce soybean aphids' potential to become a serious pest in Kansas.

The Buckthorn Connection

While the soybean aphid gets its name by being a pest of soybeans, it overwinters on buckthorn, the common name for a group of woody shrubs found in forest edges, woodlots, roadsides, fencerows, field borders, and ornamental plantings.

There are several species, but common buckthorn (*Rhamnus cathartica* L.), a native of Eurasia, is often cited as an important overwintering host for the soybean aphid. This species of the buckthorn family (Rhamnaceae) can grow to 22 feet high and have a trunk up to 10 inches wide. The crown shape of mature plants is spreading and irregular. The bark is gray to brown, rough textured when mature, and may be confused with plum trees in the genus *Prunus*. When cut, the inner bark is yellow and the heartwood is pink to orange. Twigs are often tipped with a spine.

In spring, clusters of yellow-green, four-petaled flowers emerge from stems near the bases of leaf stalks. Male and female flowers are borne on separate plants. Small, black fruits about 1/4 inch in cross-section that contain three to four seeds, form in the fall on female



Common Buckthorn. (Photo by Marlin Rice, Iowa State University.)

trees. Leaves, opposite to sub-opposite, are broadly oval, rounded or pointed at the tip with jagged, toothed margins and three or four pairs of up-curved veins. The upper and lower leaf surfaces are hairless. Leaves appear dark, glossy green on the upper surface and stay green late into fall, after most other deciduous leaves have fallen.

A similar species is glossy buckthorn (*Rhamnus frangula*). Glossy buckthorn does not have a spine at twig tips, its leaves are not toothed, and the undersides of the leaves are hairy. Both species were introduced to the United States from Eurasia for use in windbreaks and hedges. Buckthorn thrives under difficult growing conditions and berries are spread by birds, buckthorns have escaped from their original plantings and can be found throughout the landscape.

While the exact distribution of these and other buckthorn species is not well documented, they are known to occur in Kansas. Their presence and abundance in an area may be a significant factor in determining the future status of the soybean aphid as an economically important pest in the state. However, the aphid is also capable of fairly long-range migrations, so the lack of buckthorn in an area may not ensure that serious aphid damage could not occur.

Damage

Infestations that peak during blooming (R1-R2 growth stage) can stunt soybean plants so fewer pods and seeds develop, lowering yields. Leaves may be distorted, turn yellow, and plant parts may become covered with a dark, sooty mold that grows on the honeydew. Honeydew is the waste product released by aphids as they feed on plant juices.

The soybean aphid also can transmit viral diseases including alfalfa mosaic, soybean mosaic, bean yellow mosaic, peanut mottle, peanut stunt, and peanut stripe. Depending on the disease, virus-affected plants often exhibit symptoms of mosaic discoloration (yellow and green mottling) of leaves, pronounced distortion of leaves, deformed pods, fewer pods, and discolored seed. Preventing virus transmission by suppressing aphids is not feasible.



Soybean aphids on stems and leaf petioles. (Photo by Marlin Rice, Iowa State University.)

Management Options

Management options for this pest are limited. No commercial soybean cultivars in the United States are known to be resistant to the soybean aphid. Eliminating overwintering hosts would appear to be a way to reduce populations, but it would be impractical in areas where the aphid is widely established. In addition, more research on alternate host removal is needed to determine which species of buckthorn can support overwintering populations. Too little is known about the effects of cultural management practices such as planting dates, row spacing, tillage, or irrigation practices to speculate about how these might be used to manage soybean aphid populations.



Field view of soybean aphid damage. (Photo by Marlin Rice, Iowa State University.)

Beneficial Insects

Lady beetles, green lacewings, and other beneficial insects eat aphids in soybean fields. These predators probably will be most helpful in fields with populations that have not reached damaging levels. There are some reports that the multicolored Asian lady beetle is a significant predator of this aphid. This can be good and bad. High numbers of beetles early in the season can keep aphids from getting established and causing damage in the soybeans. However, if aphids become established and lady beetles use them as a food source to build their own populations, they may cause problems by invading homes in the fall when they leave the soybean fields.



Multicolored Asian lady beetle feeding on soybean aphid colony. (Photo by Marlin Rice, Iowa State University.)

Scouting and Thresholds

During vegetative growth, look for aphids under young upper leaves and on petioles and stems in the upper canopy. When the soybeans are in the reproductive stage, look for aphids on the mid-canopy leaves, stems and pods. Soybeans in the early reproductive period are probably the most vulnerable to aphid attack.

Thresholds are not well established. However, heavy populations (several aphids per leaflet in the upper canopy) when soybeans are in the early reproductive stages would probably justify treatment. Treatments need to be applied before lower leaves are covered with honeydew or turn black from sooty mold, and before plants are noticeably stunted. Keep in mind that late-season infestations may decline rapidly as plants mature and aphids become winged in preparation for migration to winter hosts.



Soybean aphids on leaf. (Photo by Marlin Rice, Iowa State University.)

Treatment Options

If significant populations develop, insecticides likely will be needed to reduce losses. Initial research in other states has shown that several insecticides are capable of reducing aphid populations, and many of these are now labeled for use against the soybean aphid. Because this list constantly changes, specific insecticide recommendations are not included in this publication. If treatments are needed, growers should check local extension offices or the Web site listed at the end of this publication for recommendations.

Current Research

Even though the soybean aphid has not yet caused significant damage to Kansas soybeans, a proactive research and extension program sponsored by the Kansas Soybean Commission is now underway at Kansas State University. Research focuses on screening soybean germplasm for sources of resistance to the soybean aphid and on the evaluation of spray application equipment for deposition and coverage characteristics. Extension efforts are focused on monitoring populations and developing materials to help producers identify this new pest.

For more information, please visit <http://www.oznet.ksu.edu/entomology/extension/InsectInfo/Soybeanaphid.htm>.



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