

Management of Soybean Aphid

Soybean aphids are a potential pest to all soybeans grown in the United States. Heavy aphid infestations can result in severe yield losses. Routine scouting is necessary to estimate aphid populations and to determine if insecticide applications are necessary. Controlling aphids is most critical during soybean reproductive growth stages (R1 through R5).

Aphid Biology and Life Cycle

The soybean aphid is native to China and southeast Asia. They were first detected in North America (Wisconsin) in 2000 and spread throughout the north central states by the end of the summer.¹

The soybean aphid is small, pale yellow to green, with distinct black cornicles near the end of the abdomen. There are both winged and wingless forms. Aphids remove plant sap with piercing-sucking mouthparts and are often found feeding on the undersides of new growth.

The soybean aphid life cycle is complex. Soybean aphids overwinter on small woody shrubs called buckthorn. They lay eggs on buckthorn in the fall from which wingless aphids hatch in spring. These aphids will complete two to three generations on buckthorn. Winged females will then develop and move into soybeans where many generations of wingless aphids are produced. An amazing aspect of this lifecycle is the female soybean aphid's ability to reproduce live, female offspring (clones) during the summer months. These female clones are born pregnant, a unique characteristic of the soybean aphid, which explains their rapid population growth. During this time, aphid populations can grow exponentially, doubling in two to three days when conditions are favorable.² As aphid populations increase during mid-summer on soybean plants, many wingless aphids produce winged offspring that disperse and colonize other



Figure 1. Soybean aphid feeding.

areas within a field or can travel large distances with the wind, infesting other fields. Towards late summer or early fall, winged aphids return to buckthorn where they mate and lay eggs to overwinter.

Damage to Soybean

Damage occurs to soybean when large numbers of aphids remove water and nutrients from leaves and stems during feeding (Figure 1). This can cause leaf puckering, stunting, reduced pod and/or seed counts, and smaller seeds. Under heavy infestations, leaf edges may turn yellow, which may appear similar to potassium deficiency. Aphids initially colonize young leaves and branches and, as the season progresses, they move down to the middle of the plant and feed on stems and pods. The aphids excrete a substance called honeydew on which sooty mold can grow. This can give soybean leaves a black appearance and interferes with photosynthesis. Aphids can also transmit viruses such as soybean mosaic virus. Moisture stress during an aphid infestation can increase the risk for yield loss.

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Scouting and Thresholds

Effective management of soybean aphid requires consistent scouting from the seedling stage through pod-fill to track aphid populations. Begin scouting more intensively during the late vegetative stages and continue regularly at least once a week when soybeans are in the R1 through R5 growth stages. The presence of lady beetles (beneficial insects that feed on aphids) and ants (feed on the honeydew) on soybean often indicates that there is an aphid infestation. Focus on scouting late-planted soybean fields first because they are more susceptible to aphids. Look for aphids on the underside of new leaves early in the season. Aphids will move further down into the soybean canopy as the season progresses. Determine the average number of aphids per plant on 20 to 30 plants throughout the field. Edges of fields can be hotspots for aphid infestations, resulting in overestimation of populations, so make sure to scout all areas of the field. Through the R5 growth stage, treatment is justified when an average of 250 aphids per plant is found on over 80% of the plants in the field and populations appear to be increasing.^{2,3,4,5} When you find aphids concentrated on the stems during scouting, this is an indication that the population is over the threshold making counting unnecessary. Stems are an inferior food source for aphids and stem feeding is an indication of an overpopulation.

Common insect predators include several species of lady beetles and their juveniles, adult and juvenile insidious flower bugs (also known as minute pirate bugs), green lacewing larvae, and parasitoids (tiny parasitic wasps).⁶ The presence of aphid mummies is an indicator that natural enemies are present. Natural enemies may help regulate low to moderate aphid populations throughout the season; however, biological control is less effective when aphids have colonized the majority (greater than 80%) of plants in a field. Conserve natural predators when possible by using insecticides only when economic thresholds of the damaging insect are reached.

Management

Many foliar insecticides are labeled for control of soybean aphids. The early reproductive growth stages (R1 to R4) are the most sensitive to stress from aphid feeding and subsequent yield loss. Therefore, protecting plants during the flowering through pod development stages can have the greatest impact on soybean yield potential. Applications made prior to flowering may not provide an economic benefit and generally reduce beneficial insect populations, which may result in a resurgence of aphids. Applications made at or beyond the full seed stage of growth (R6) have not been found to improve yield potential unless plants are under additional stress such as drought.^{2,3} Good insecticide coverage, through the use of high water volumes and pressures, is important for reaching aphids within the soybean canopy. Treat fields only when needed to reduce insecticide exposure to soybean aphids and reduce the selection pressure for the development of resistance to insecticides.⁷

Soybean seed treatments can help provide early season protection from soybean aphids and help to delay aphid population increases, especially in late-planted situations. Aphid resistant soybean products are another tool for growers to use in reducing the effect of aphids on yield potential. Aphid resistance (Rag) genes are naturally occurring in soybean germplasm but are not yet available in all commercial soybean products. Resistant varieties result in aphid populations developing slower as compared to populations feeding on susceptible plants, often preventing them from reaching economically damaging levels. Resistant soybean products are not aphid free but can have fewer aphids and offer a higher tolerance level compared to susceptible soybean products.⁸ Growers are still encouraged to regularly scout for soybean aphids regardless of the use of resistant soybean products.

Sources

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Legal Statements

ALWAYS READ AND FOLLOW PESTICIDE LABEL DIRECTIONS. Performance may vary, from location to location and from year to year, as local growing, soil and weather conditions may vary. Growers should evaluate data from multiple locations and years whenever possible and should consider the impacts of these conditions on the grower's fields.

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