



Soybean Aphid

A New Insect Pest Discovered in Virginia: Background and Survey

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A new insect pest was discovered in Virginia soybean fields in the summer of 2001. Following is a brief summary of its biology, its occurrence in the U.S. and Virginia, and its potential threat to, and impact on, soybean production.

Biology

Soybean aphid (SBA), *Aphis glycines* Matsumura, is native to Asia. Its primary host is buckthorn, where eggs are deposited for overwintering. Eggs hatch in the spring into parthenogenetic (reproduce without mating) wingless females. They produce winged females that migrate into soybean and begin producing live young. SBA can pass through 15-18 generations in a summer season, producing both winged and wingless forms. Two seasonal peaks occur, in July and September, with the greatest damage associated with the first. Near soybean maturity, winged males are produced, as well as winged parthenogenetic females, that both migrate back to buckthorn. The winged parthenogenetic females produce wingless females that mate with winged males. These mated females lay eggs, beginning a new cycle. In the summer, SBA feeds mostly on soybean, although some weedy legumes (including kudzu) are reported as possible hosts in China. There are also reports that it can colonize *Phaseolus* species (green beans) and transmit diseases that cause significant losses. SBA seems to prefer a relatively cool (72-77°(F), low relative humidity (78%) environment.

U.S. Occurrence

SBA was first reported in the U.S. (Wisconsin) in the summer of 2000. By the end of that summer, presence was confirmed in IA, MI, IL, KY, IN, MN, MO, OH, and western-most WV. This widespread distribution suggested

that the aphid had probably already been in the U.S. for 3-4 years. By 2001, SBA distribution expanded to include NE, NY, PA, and VA.

Impact on Soybean

SBA feeds by sucking plant sap, which can cause leaf curling and plant stunting. A charcoal-colored residue can build up on leaves and stems that is a fungus called sooty mold. The mold thrives on the sugary honeydew that is excreted onto plant surfaces by aphids as they feed. Early populations feed on developing leaves, stems and petioles in plant terminals. As plants grow, populations can expand to the mid-level canopy and feed on the undersides of leaves. Early season infestations that peak in the early soybean reproductive growth stages (R1 - R2, early - full flowering) can cause yield loss of up to 52%. Loss from late-season feeding is minor-to-undetectable, unless virus is present. SBA can transmit several viruses, the most commonly reported being soybean mosaic. It is not known to transmit disease in Virginia at this time.

Management

Estimates by Iowa State University based on data from China suggest an economic threshold of 4 aphids per plant on 2-leaf growth stage soybean. Later-season populations should not require treatment as natural enemies usually provide good control. Natural biological control can be accomplished by a variety of natural enemies including predators like lady beetles and lacewings, parasitic wasps, and an aphid fungal disease. If needed, several insecticides have been shown to provide effective control.

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2001 Virginia Survey

Faculty and staff from the Department of Entomology, Virginia Tech (D. A. Herbert, Jr., E. R. Day, M. Arrington), and a Virginia Cooperative Extension Area IPM Agent (D. Tuckey) surveyed 40 counties in the summer of 2001. One hundred and nine fields in 30 counties were surveyed in July or August and no aphids were found. Eighty-eight fields in 25 counties (some new, others revisited) were surveyed in September and aphids were found in 24 of the counties surveyed. Identification was verified by Gary L. Miller, Systematic Entomology Lab., ARS, USDA. Most populations were considered low level with occasional small colonies of 3-8 aphids on some leaves. Two counties, King and Queen and King William, had one or two fields with moderate population levels, having colonies on most leaves, and large numbers on some plant terminals. It is thought that SBA infestations migrated into Virginia as winged adults from earlier-season infestations in more northern and/or western states. Because infestations did not occur until September, no yield loss was reported.

Does soybean aphid pose a threat to Virginia soybean?

Only time will tell, but the relative scarcity of buckthorn species, the overwintering host, in major soybean-growing areas suggests that early season infestations may not become common. Late season migrations from other states, as occurred in 2001, should not pose a threat. Infestations in soybean near maturity have not resulted in significant yield reductions. Also, natural enemies are proving to be effective in reducing aphid populations in several states making insecticide treatments unnecessary.



Photo 1
Colony of soybean aphids on a soybean pod.



Photo 2
Colony of soybean aphids on a leaf petiole.
(D. Tuckey, VCE)

Overwintering Hosts in Virginia

SBA overwinters on buckthorn species, a woody shrub/small tree that is found in forests and is used as an ornamental in some areas of the U.S. Three native buckthorn species are not widespread and are known to occur in Virginia, mostly in western mountain Counties. (Tom Wiebolt, Massey Herbarium, Virginia Tech). Two exotic (introduced) buckthorn species are recorded as escapes in Virginia: *R. cathartica*, or common buckthorn and *R. frangula*, or glossy buckthorn (also known as *Frangula alnus*). *Frangula* may be "occasionally" sold as hedge plants.

Common buckthorn

(pictured here) is a shrub or small tree that can grow to 22 feet in height and have a trunk up to 10 inches wide. The crown shape of mature plants is spreading and irregular. Leaves are broadly oval, rounded or pointed at the tip, with 3-4 pairs of upcurved veins, and have jagged, toothed margins. The upper and lower leaf surfaces are without hairs. Leaves appear dark, glossy green on the upper surface and stay green late into fall, after most other deciduous leaves have fallen. The bark is gray to brown and rough textured when mature. When cut, the inner bark is yellow and the heartwood, pink to orange. Twigs are often tipped with a spine. In spring, dense clusters of 2 to 6, yellow-green, 4-petaled flowers



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emerge from stems near the bases of leaf stalks. Small black fruits, about 1/4 inch in cross-section and containing 3-4 seeds, form in the fall. Glossy buckthorn (not shown here) does not have a spine at twig tips, leaves are not toothed, and the undersides of the leaves are hairy.

