Soybean aphid management in Michigan

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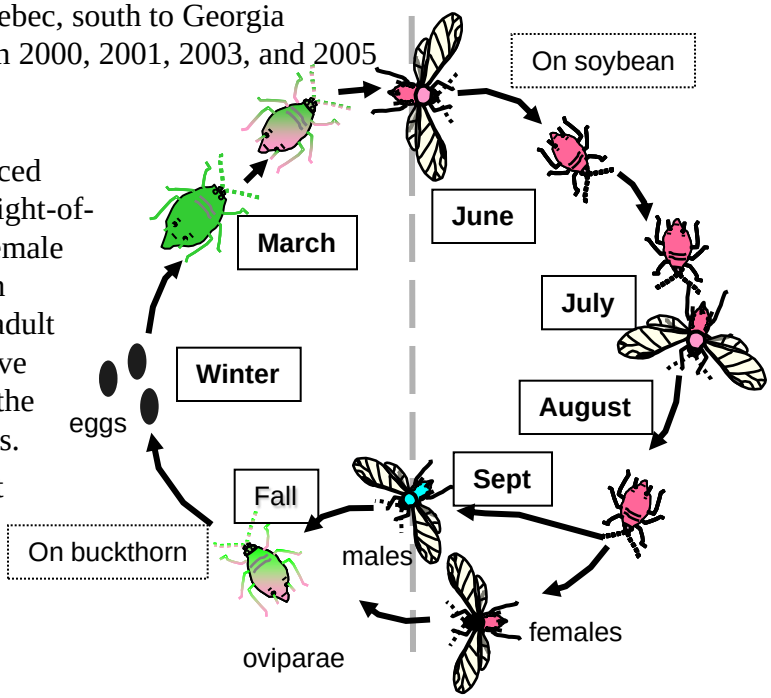
CDD #001

History of Soybean Aphid (SBA) in the U.S.

- ✓ Native to Asia; Discovered in North America (and Michigan) in 2000
- ✓ Now widely distributed from the Dakotas to Quebec, south to Georgia
- ✓ Widespread outbreaks (sprayable populations) in 2000, 2001, 2003, and 2005

Lifecycle

SBA overwinters as eggs on buckthorn, an introduced invasive shrub, commonly found in treelines and right-of-ways in Michigan. In the spring, eggs hatch into female aphids, which reproduce for several generations on buckthorn. With each generation, a portion of the adult aphid population is winged. The winged adults leave buckthorn to find their summer host, soybean. By the third generation, most or all of the SBA have wings.



The first aphids leaving buckthorn probably do not find soybean, and many of these first migrants die. But as the season progresses, aphids find fields to colonize. In parts of Michigan where buckthorn is common (for example, SE & central MI) SBA colonizes V1 plants that are just emerging.

Areas lacking buckthorn (for example, SW MI) are colonized later. The SBA colonizing these fields are produced in soybean fields in June, perhaps many miles away. Aphids may even be carried on weather fronts from other states. In any case, any soybean field in the state of Michigan is potentially at risk from SBA by mid to late July.

Impact on soybean

Once aphids colonize soybean, populations may increase rapidly under favorable conditions.

- ✓ SBA sucks plant sap; there may be thousands of aphids per plant during outbreaks
- ✓ Honeydew secreted by SBA coats leaves & promotes growth of black sooty mold on leaves
- ✓ Many aspects of plant growth are affected by SBA feeding, depending on aphid number, plant stage, and the timing of infestation: *Shorter plants*; *Fewer nodes, flowers, pods and beans per pod*; *Smaller bean size; Change in oil or protein content*
- ✓ SBA also transmits viruses of soybean, potato, dry beans, and vine crops.

Scouting

Begin end of June or the first week of July in SE/ central MI. You may have to visit fields several times in July to determine if aphid numbers are increasing towards threshold. If you have limited time, continue to check untreated fields in favor of revisiting treated fields. Examine whole plants, as aphids prefer different parts of the plant depending on plant stage.

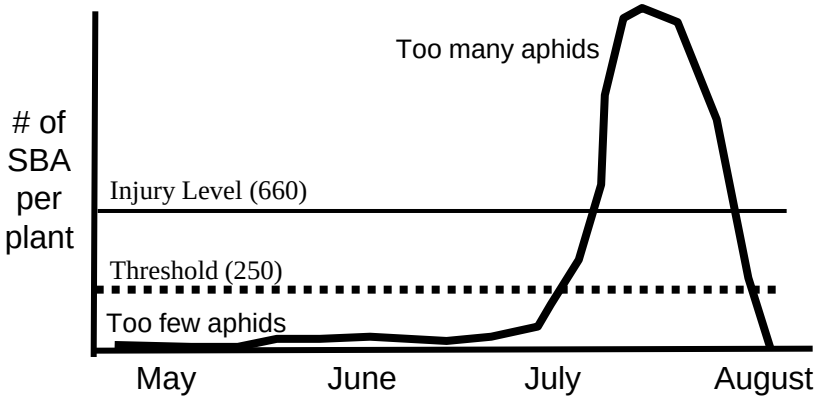
Pay special attention to:

- fields with buckthorn nearby (colonized early in the season)
- late-planted fields (have higher aphid populations later in the season)
- fields under drought stress or potassium deficiency (aphid populations are higher under these conditions)

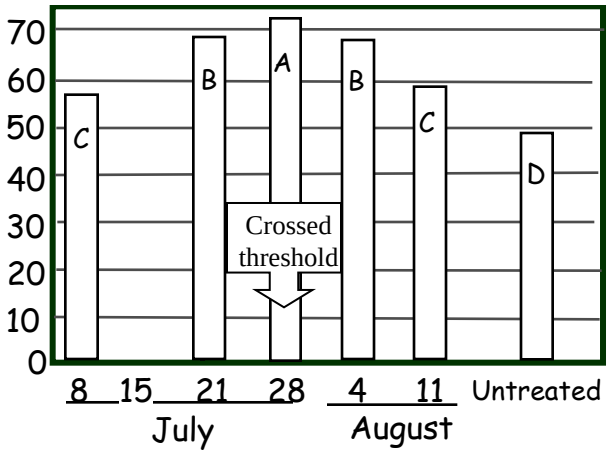
Components of Soybean aphid management

Natural Control – There are many predators that eat SBA, as well as fungi that infect and kill aphids under warm, wet conditions. Although in some years (such as 2005) aphid outbreaks occur, in other years (such as 2006) SBA numbers were held in check primarily by natural biological controls.

Use a threshold: University research across multiple locations, years, and varieties shows spray applications should be targeted when aphids reach 250 per plant, and populations are actively increasing. You have several days to make an application before aphid numbers reach the injury level of 660 per plant, where actual economic yield loss occurs. In practical terms, populations are at or near threshold when at least 90% of plants are infested, and the new growth is covered with aphids.



Yield, bu/acre, Sanilac County MI, 2005.



The bar graph to the left shows why it is important to treat aphids at threshold. Plots sprayed on threshold (July 28) had the best yield compared to an untreated check. Plots sprayed later (August) when aphid numbers were high had lower yield from aphid damage. Plots sprayed before the population reached threshold (July 8 or 21) also suffered yield loss. Natural enemies were killed, so SBA populations rebounded after spraying. Also, insecticide residual from the early applications already broke down by late July when winged aphids were landing in fields.

Choosing an insecticide – There are many foliar insecticides registered for aphid control (see MSU Bulletin E-1582 for a complete list). All are restricted use pesticides.

Common foliar-applied insecticides

Trade name	Type	Rate/acre	PHI (days)
Asana XL	Pyrethroid	5.8 oz	21
Baythroid 2	Pyrethroid	2.8 oz	30
Chlorpyrifos 4E	OP	1 pint	28
Lorsban 4E	OP	1 pint	28
Mustang Max	Pyrethroid	4 oz	21
Proaxis	Pyrethroid	3.2 oz	45
Warrior	Pyrethroid	3.2 oz	30

Most pyrethroids have long residual control, 10-14 days or more depending on environmental conditions. However, excellent control depends on excellent coverage. They also kill beneficial insects for days after application. Lorsban has a shorter residual (less than a week), but exhibits a 'fuming' action under hot conditions, so control may reach nearly 100%. There are also several seed treatments registered for aphid control; they begin to lose effectiveness 35-40 days after planting. Thus seed treatments are recommended only where early season colonization is heavy (SE MI) or other early-season pests are present.

Improving insecticide performance

The bottom line is that many insecticides will do a good job controlling aphids, as long as timing and coverage are optimal. The goal is to deliver insecticide to all aphid-infested surfaces. To improve coverage:

✓ Use a minimum of 20 gallons per acre & Increase spray pressure

✓ Use nozzles designed for insecticide or fungicide application, not herbicide application

✓ To minimize late-season crop damage, plant in 30-inch rows or leaved skip-rows in drilled beans.