Soybean aphid management

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After soybean aphid (SBA) kicked butt in 2001 and 2003, most people realize that scouting for aphids can pay for itself. Although SBA is a relatively new pest in the U.S., researchers have learned a lot about this insect in the last several years. In December 2003, entomologists from 11 universities plus the Canadian government met in Chicago for a one-day work session on SBA. By the end of the day, we reviewed data from field trials across the Midwest, and developed consensus recommendations for scouting and treatment recommendations. Below is a summary of this consensus. It is also available online in a slightly different form at the NCSRP's Plant health Initiative web site at: http://www.planthealth.info/soyaphid.htm.

Finding aphid on soybean

In previous seasons, we found soybean aphids very soon on newly emerged plants; many fields in central Michigan are thus colonized in June. These aphids are coming off of their overwintering host, buckthorn, and looking for soybean. Searching for aphids early in the season may seem like looking for a needle in a haystack, but here are a few tips.

i. Look for plants with ladybugs. Ladybugs are looking for lunch, and they are better than you at finding small aphid colonies on plants.

ii. Look for plants with ants. Ants eat the sticky honeydew secreted by aphids. We have observed several different ant species tending aphids up on soybean plants. The ants protect aphids from predators - for example, ladybugs. Essentially, the ants are farming the aphids like cattle!

So, early in the season, use ladybugs and ants to help you find SBA.

Scouting

When? Although soybeans are colonized by SBA in June, it takes a few weeks for the aphids to increase in the field. Therefore, I recommend first scout soybean fields at the end of June or the first week of July in southern and central Michigan. If you know certain areas have buckthorn nearby, target these fields first.

What? Examine WHOLE PLANTS. In the past, I tried to develop a rating system to Íquickly assess the numbers of aphids per leaflet or leaf. These rating systems worked well when we had thousands of aphids per plant, or evaluated an insecticide trial. But they don't work as well to determine if aphid numbers are at threshold. Also, researchers found that aphids redistribute themselves on the plant as the season progresses, probably due to temperature or nutritional status of different parts of the plant. This made it difficult to develop a rating system based on a particular plant part. Bottom line, entomologists across the Midwest agree that whole-plant counts are the preferred method to scout for aphids, and the threshold for soybean aphid (see below) is based on a whole-plant count.

Where? You can scout for aphids at any location in your field. Research in Minnesota tracking aphid colonization of fields shows that 'edge effects' are weak for SBA. Edges of fields next to buckthorn do get aphids a bit sooner than other parts of the field, but by the time many winged aphids appear in the population, they move around the landscape and rain out across the field. In Michigan, we do find hot spots associated with low potassium levels – high numbers of aphids in yellowing patches – but this usually occurs later in the summer when aphid numbers in general are already over threshold.

How Long? For the most part, optimum spray timing occurs between mid-July into early August, so scouting should be targeted across that time period. You may have to visit fields several times in July to determine if aphid numbers are increasing towards threshold (in 2002, they did not!). If you have limited time, continue to check untreated fields in favor of revisiting treated field – the majority of data I've seen does not show an economic advantage to treating twice, so it is unlikely you need to continue scouting to make another application. Remember, in 2003 aphid numbers increased later in the season at some locations in the Thumb, so I can't rule out checking unsprayed fields in August.

Pay attention to:

- fields with buckthorn nearby (colonized earlier in the season)
- late-planted or double-cropped beans (have high aphid populations later in the season)
- fields under drought stress (yield loss from aphids is greater under drought)
- fields with potassium deficiency, such as sandy soil type or beans planted after alfalfa (appears to be an interaction between low K and SBA)

When to treat

Researchers from the University of Minnesota gathered data from various university research trials to relate aphid number to soybean yield. They calculated the aphid density that led to an average yield loss of $12 per acre (the average cost of treatment in Minnesota in 2003). Then they took this aphid density and modified it to build in a 7-day spray window. This essentially reduces the threshold by several magnitudes to 250 SBA PER PLANT. We feel comfortable using this recommendation for soybeans in the vegetative stage, the R1 /R2 stages (flowering), and the R3 / R4 stages (early pod formation). After R4 (generally mid-August and beyond), we believe the threshold is higher, although we do not yet have data to modify the threshold for late-season populations.

Why build extra time into the threshold? If you couldn't take action immediately when insects are at the point of causing $12 loss (for example, it rains before spraying or you need to purchase insecticide), then you would already be losing significant yield by the time you treat. The 7-day spray window for soybean aphid is a bit longer than most, but for good reason. First, data from the laboratory shows that under optimal temperature conditions (77 degrees F) SBA populations can DOUBLE IN 1.5 DAYS. This is one of the fastest doubling times recorded for an aphid. This also explains why fields seem to go from OK to bad in a matter of days! So, providing a few days buffer allows you to recognize aphids are at threshold and do something about it before suffering yield loss. Second, from experiences in 2001 and 2003, we know when aphids become a problem on one farm, they are often a problem across an entire region. You need to spray, your neighbor needs to spray, everyone needs to spray. Commercial applicators may have trouble meeting demand in a short time frame. We also had shortages of certain insecticides in pervious seasons. A 7-day

spray window eases some of this pressure so that you can afford to wait a few days before application. So, again, the current recommendation is 250 aphids per plant – and this threshold was agreed upon by most extension entomologists in the Midwest.

One final practical note – For researchers conducting trials on thresholds and yield loss, it is important to know the number of aphids per plant. However, I realize that a threshold based on number of aphids per plant is inconvenient and time consuming for most others. The good thing is that isn't that difficult to recognize a field at threshold with a little practice. What will a field look like if it is near threshold?

i. Most, if not all, of the plants will be infested.
ii. Actively growing leaflets at the top of the plant often will be covered with aphids. 2-3 heavily infested leaflets probably amounts to 250 aphids.
iii. The populations will be high enough on certain plants that some aphids move to the stems or developing pods.

So, if 90 percent of the plants in a field have multiple, heavily-infested leaflets, plus some aphids beginning to infest stems, for practical purposes the field is likely near or at threshold.

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