Determining Optimum Spray Timing for the Soybean Aphid

Project GREEEN No.: **GR04-006**

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Statement of Challenge

Soybean aphid is a soybean pest native to Asia. It was first found in North America in August, 2000. In 2001, yield losses of 40% were documented in Michigan in unsprayed versus insecticide-treated plots. In 2002, SBA were found in all fields, but at low, non-damaging levels. In 2003, an SBA outbreak greatly reduced soybean yields. Millions of acres were sprayed in the northern U.S. and Ontario, including an estimated 740,000 acres in Michigan at an estimated cost of $9 million. Prior to 2001, insecticides were rarely used on Michigan soybeans, so the introduction of SBA dramatically increased both the time and money spent in bean fields. In 2003, an important challenge identified in controlling SBA was the timing of SBA control . When is too early? When is too late? Does SBA spray timing coincide with applications of herbicides so growers can save money? Is the current regional threshold of 250 SBA per plant valid? The first year of this project (2004) addressed this challenge, optimizing timing of SBA control.

Objective

Optimize spray timing for the soybean aphid under Michigan production conditions.

Results and Accomplishments

Trials were established at three locations in Michigan: the MSU campus (Ingham County), the MSU Bean and Beet Research Farm (Saginaw County) and East Leroy (Calhoun County). All locations had heavy SBA pressure in 2001 and 2003. Four-row by 40-foot plots were cut out of existing soybeans fields; there were 12 treatments per replicate and 3 replicates for a total of 36 plots per location. Beginning the week of 5 July until the last week of August, plots were scouted weekly to determine the average number of SBA per plant and plant stage (each location was visited on the same day each week, Monday through Wednesday). Each week, a predetermined set of plots was sprayed with Lorsban at 1 pint per acre. In addition to the 8 single-spray treatments, two treatments were sprayed twice, one treatment was treated as needed (treated check), and one treatment was not sprayed (untreated check). In late October, the center two rows of each plot were harvested with a small-plot combine, the beans weighed, and yield corrected to 13% moisture. Data was analyzed using SAS, and information was incorporated into the SBA extension presentation for the 2005 winter field crops meetings.

Among the trial locations, as well as across Michigan and most of the Midwest, SBA populations were low in 2004. In general, the number of SBA was below 1 per plant in most plots and at most sample times. On the MSU campus, the HIGH number of SBA in any given treatment in any given week was 3 per plant. At the MSU Bean and Beet Farm, the recorded high population was 23 SBA per plant in a single treatment on 18 August. At East Leroy, the recorded high population was 33 SBA per plant in a single treatment on 18 August. These ‘high’ populations were isolated events, present for only one week. Recall that the SBA action threshold established

by extension entomologists is 250 SBA per plant. Thus, under real-world conditions, these locations should not have been treated for SBA in 2004.

The lack of SBA pressure, and the lack of economic return, was borne out by yields in the trials. Yield did NOT differ significantly by spray date, or in sprayed versus unsprayed plots at any location (Table 1). Thus early-season preventative applications were NOT justified under the low SBA populations, nor were later-season applications done because SBA were simply present in fields. Spraying low populations WAS NOT ECONOMICALLY JUSTIFIED. However, thus far in 2005 (year 2 of the project), aphid numbers are quite high, allowing us to conduct the project under heavy aphid pressure, over the recommended threshold.

Table 1: Soybean yield at three research sites in Michigan, 2004 field season, in sets of plots sprayed weekly between 5 July and 23 August.

Treatment the week of:	Yield, bu/acre		
	Bean & Beet*	**MSU campus***	**East Leroy***
Untreated Check	45.7	58.4	39.3
Treated Check	48.4	56.5	40.3
5 July	45.8	52.7	40.8
12 July	43.7	58.3	35.9
19 July	46.3	55.1	41.7
26 July	47.6	56.1	43.0
2 August	45.9	59.1	38.6
9 August	48.6	59.3	44.1
16 August	45.0	54.7	38.1
23 August	45.5	57.6	43.3
19 July / 2 August	45.2	57.2	41.3
19 July / 16 August	43.7	58.1	36.6

** There are no significant differences in yield among treatments at any location.*

Impacts

Year 1 of this project demonstrated the following:

* *Early-season 'insurance' applications for SBA, particularly timed with glyphosate application, were not justified under low aphid levels.* Investing in a treatment, given low SBA pressure and populations which never increased, costs $8 to $12 per acre in application costs, with no significant return in yield. Early sprays cannot 'prevent' aphid outbreaks in years when there were no or few aphids to 'prevent' in the first place. Optimum spray timing is unlikely to coincide with glyphosate application in early July, because aphid are just entering the field, and may not increase for the rest of the season.

* *If aphid numbers are well below the recommended threshold of 250 SBA per plant, insecticide sprays are unnecessary and costly.* No yield benefit results from treating very low aphid populations at any point in the season.

These impacts were communicated to agribusiness and producers via extension presentations and newsletters during winter extension meetings to reduce this type of practice in the 2005 field season.

Summary Statement

Early season insurance applications do NOT protect yield under the low SBA populations, nor do later-season applications done because SBA are simply present in fields well-below threshold levels. Spraying low numbers of soybean aphid is not economically justified.

Funding Partnerships

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