



Soybean aphid chemical control: foliar sprays

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General lessons from many trials in 2005

- Scouting pays: Soybean aphid (SBA) problems were detected early by scouting and variability in infestation (and need for treatment) was also noted.
- Residuals differ: OPs tend to have better initial kill but shorter residual. Pyrethroids tend to have longer residual.
- Yields often don't differ: In the end, however, yield generally depends more on spraying itself, then on choice of insecticide.
- Coverage counts: Coverage probably explains many of the performance problems with various insecticides.
- Tank mixing: Tank mixes of pyrethroids with Lorsban did not improve yield.
- Reduced rates: Reduced rates of insecticides did not provide adequate control or improve yield.

MSU Recommendation

- Do scout fields more than once, beginning in mid-June;
- Do use a threshold of 250 SBA per plant with **increasing** aphid populations, through the R5 plant stage [in practice: nearly every plant has aphids, aphids cover the top leaves of the plant, and may be moving to the stems]
- Do use a full rate of an insecticide;
- Do optimize coverage = 40 psi, at least 20 GPA, nozzles recommended for insecticides;
- Do not tank-mix reduced rates of several products.

The 2005 field season was a great year to test foliar sprays for soybean aphid control. Below I summarize the results of several trials comparing insecticide sprays to untreated plots. Please note that some of the products in the trials are **not** currently registered for soybean. Table 1 shows a complete list of products tested in our trials, plus information on chemistry, manufacturer and registration on soybean.

Table 1

Insecticide / Formulation	Active ingredient	Insecticide type	Company	Labeled for soybean?	Rate(s) tested per acre
Asana XL	esfenvalerate	Pyrethroid	Dupont	Yes	6.4 oz
Assail 70WP	acetamiprid	Neo-nicotinoid	Cerexagri	No	2.5 oz
Baythroid 2E	cyfluthrin	Pyrethroid	Bayer	Yes	2.0 - 2.8 oz
Centric 40WG	thiamethoxam	Neo-nicotinoid	Syngenta	No	3 oz
Decis 1.0 EC	deltamethrin	Pyrethroid	Bayer	No	1.5 - 1.9 oz
Leverage 2.7SE	acetamiprid	Neo-nicotinoid	Bayer	No	3.76 oz
Lorsban 4E	chlorpyrifos	OP	DowAgro	Yes	16 oz (1 pint)
Orthene	acephate	OP	Valent	Yes	1 lb
Proaxis	gamma cyhalothrin	Pyrethroid	DowAgro	Yes	3.2 oz
Trimax SC	imidacloprid	Neo-nicotinoid	Bayer	No	1.5 oz
Warrior	lambda-cyhalothrin	Pyrethroid	Syngenta	Yes	3.2 oz

Efficacy trials were done at the Saginaw Valley Bean and Beet Farm in a field planted on May 5 and at the MSU Campus Farms in fields planted on May 17 (Entomology) and in mid-June (Botany). At all locations, treatments were made when SBA populations crossed the threshold of at least 250 SBA per plant, using 23 GPA, 40 PSI and Twinjet nozzles. The field at the bean and beet farm was sprayed on July 14 in the R2 plant stage at an average aphid population of 830 SBA per plant. Aphid counts were taken 4, 7, 14, and 21 days after treatment. The field at the MSU Entomology Farm was sprayed on July 27 in the R4 plant stage at an average aphid population of 356 SBA per plant. Aphid counts were taken two and seven days after treatment. The field at the MSU Botany Farm was sprayed on July 20 in the V4 plant stage at an average aphid population of 372 SBA per plant. Aphid counts were taken 5 and 14 days after treatment.

Table 2 summarizes insecticide rankings at various days after treatment (DATs). Treatments were included in the table only if they were done in at least two of the three trials. Counts from the MSU Entomology Farm (2 and 7 DAT) and Botany farm (5 and 14 DAT) are reported together, since the fields were adjacent.

At the MSU Farms, treatments including Lorsban knocked aphids back quickly (white cells, 2 DAT). But within five to seven days, several of the pyrethroid and nicotinoid treatments (Assail, Proaxis, Warrior) had the lowest aphid counts, an effect of residual kill. By 7 DAT, some treatments were back over threshold and by 14 DAT many plots were near or over 1,000 SBA per plant. The effect of residual is clear by 14 DAT; plots sprayed with shorter-residual products (Lorsban, Orthene) had over 1,000 SBA per plant (black shaded cells), while plots sprayed with longer-residual insecticides (some pyrethroids and nicotinoid) had fewer aphids (dark gray-shaded cells). In late July through early August, a large number of winged aphids landed in soybean at MSU, and fields were re-infested quickly. This made it very challenging to maintain aphid control.

In contrast to the challenges at the MSU Farms, insecticides worked well at the bean and beet farm. Even by 14 DAT, SBA numbers were still under 100 SBA per plant in most treatments (light-gray shaded cells), compared to nearly 2,000 SBA per plant in the untreated check. By 21 DAT there was over 2,800 SBA per plant in the untreated check. However, most treated plots were still below 250 SBA per plant (Table 2 medium-gray shaded cells). The treatments over threshold have known shorter residual. Table 2 clearly shows this difference in residual. This table shows the aphid populations in treatments sprayed with insecticides currently registered on soybean. At 4, 7 and 14 DAT, all treatments still had less than 250 SBA per plant. By 21 DAT, treatments were separating out by residual: the OPs Orthene, Lorsban, or a tank mix of Lorsban with Baythroid all had over 250 SBA per plant, while the longer lasting pyrethroids remained under 250.

Key to table 2

- Shading of cells indicates the average SBA population per plant in the treatment:

Less than 50	50-100	100-250	250-1,000	Over 1,000
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- Rank: For each date, treatments are ranked from fewest SBA per plant (1) to the highest. If counts were close, within a few aphids of each other, the treatments were tied.
- A star* indicates that the aphid population is significantly less than the population in the untreated check.

Table 2

Product	Rate/ acre	MSU Farms				B&B Farm			
		2 DAT	5 DAT	7 DAT	14 DAT	4 DAT	7 DAT	14 DAT	21 DAT
Asana	6.4 oz	4*	4*	7*	4*	6*	2*	3*	3*
Assail	2.5 oz	6	9*	2*	1*	1*	1*	1*	3*
Bay + Lors	2oz+ 8oz	2*	3*	4*	9*	1*	1*	4*	4*
Baythroid	2.8oz	3*	3*	5*	8*	4*	1*	2*	4*
Centric	3 oz	---	3*	---	3*	2*	1*	1*	1*
Decis	1.9 oz	8	7*	9	11*	7*	4*	9*	6*
Leverage	3.76 oz	6	5*	6*	7*	3*	1*	5*	5*
Lorsban	16 oz	1*	6*	8*	6*	1*	1*	6*	7*
Orthene	1 lb	5	8*	3*	10*	5*	5*	7*	8*
Proaxis	3.2 oz	---	1*	---	1*	1*	1*	2*	2*
Trimax	1.5 oz	7	8*	10	5*	2*	3*	8*	9*
Warrior	3.2 oz	4*	2*	1*	2*	1*	1*	2*	6*
<i>Untreated</i>	--	9	10	11	12	11	6	10	10

Yield

Yield was taken only from the bean and beet and Entomology trials (the botany trial was planted very late). Table 3 shows average yields at both locations, and yield rankings from highest to lowest. The untreated yield is italicized, and the top-yielding treatments (Asana at the ENT Farm, Centric at the B&B Farm) are in bold lettering. For each location, yields followed by a star were significantly better than the untreated check; yields in cells shaded gray were statistically similar to the top yielding treatment.

At the entomology farm, the top two treatments (Asana, Assail) clearly yielded significantly better than the untreated check. Most of the remaining treatments were somewhere in the middle, between the best yielding treatments and the untreated check. Two treatments, Trimax and a low rate of Baythroid, actually yielded less than the untreated check. This study was sprayed on July 27. Recall that the next week, large numbers of winged aphids landed at this location, and fields were re-infested quickly. This may account for the wide variation in yield.

At the bean and beet farm all treatments yielded better than the untreated check. The top 11 treatments had similar yield. Only Trimax yielded less than the others, but it still yielded better than no spray. In the end, the important thing appears to have been getting an application on at the right time, rather than choosing a particular product. In Table 3, the insecticides currently registered on soybean are Asana, Baythroid, Lorsban, Orthene, Proaxis, and Warrior. Yields for these six products were not different from each other, ranging from 49 to 53 bu/acre compared to 39 bu/acre in the untreated check.

Table 3

Insecticide	Rate/ acre	Entomology farm		Bean and beet farm	
		Yield, bu/acre	Rank	Yield, bu/acre	Rank
Asana	6.4 oz	68*	1	53*	5
Assail	2.5 oz	66*	2	54*	2
Bay + Lors	2oz + 8oz	61	7	51*	7
Baythroid	2.8oz	62	6	50*	8
Baythroid	2.0 oz	54	11	--	--
Centric	3 oz	--	--	55*	1
Decis	1.9 oz	64	3	49*	11
Leverage	3.76 oz	60	9	52*	6
Lorsban	16 oz	60	8	50*	9
Orthene	1 lb	62	5	49*	10
Proaxis	3.2 oz	--	--	53*	3
Trimax	1.5 oz	53	12	46*	12
Warrior	3.2 oz	62	4	53*	4
<i>Untreated</i>	--	56	10	39	13



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