



## Soybean aphid chemical control: seed treatments

*Christina DiFonzo, Entomology*

There are now two new seed treatments registered for soybean. Cruiser (thiamethoxam) was available in 2005; Gaucho (imidacloprid) can be used in 2006. Soybean seed can be ordered already treated, or treated by a commercial outfit after purchase. In most cases, insecticide-treated seed will also be fungicide-treated. The prices we were recently quoted for Cruiser and Gaucho treated seed were between \$9 and \$12 per unit (50 lb bag) = \$10 to \$14 per acre.

Cruiser and Gaucho protect seeds in the ground from early season insect pests, such as seedcorn maggot and wireworm. Both products may have an impact on grubs, although grub control is not listed on either label. Both products are also systemic. The active ingredient moves up into the plant as it grows, protecting foliage from insect feeding for approximately 30 to 40 days. Bean leaf beetle is one target for the systemic action. Bean leaf beetles overwinter as adults, and the adults emerge in the spring to feed on small soybean plants. First generation bean leaf beetle feeding is usually not a concern in Michigan, but there may be areas in southern Michigan with isolated problems. Another obvious target for seed treatments is the soybean aphid. Early season aphid colonizers from buckthorn probably deposit nymphs on treated bean leaves (they likely cannot detect treated beans), but the nymphs themselves do not survive. This delays colonization of the field by several weeks.

Eventually, as the plant gets larger and the insecticide breaks down, the dose of insecticide in the plant is no longer lethal. At that point, aphids feeding on treated beans get a sub-lethal dose of insecticide; research from the University of Minnesota shows that aphids have fewer nymphs on seed-treated beans. But these aphids may not die. Populations on treated beans can still go over threshold when populations are heavy, although the number of aphids per plant may remain less than untreated beans.

From an economic standpoint, Cruiser and Gaucho treatment is an insurance policy, not an IPM-based strategy. When soybean aphid isn't present or numbers are low (as in 2004), seed treatments generally do not yield any more than untreated beans (see Table 1). As insect pressure increases, Cruiser and Gaucho will protect yield from early season aphid feeding, but if the outbreak continues, seed treatments wear out. You may need to spray seed-treated fields later in the season. Cruiser and Gaucho might be more useful on early-planted beans in areas with heavy overwintering populations of soybean aphid (for example, southeast Michigan). In outbreak years, these fields are colonized early by aphids, when a lethal dose of insecticide is still in the plant. Over the long-term, you probably are better off with a well-timed, scouting-based foliar spray made only if fields are over threshold. In years with low aphid numbers, you essentially preserve \$10-\$12 per acre in profit by not spending money on aphid control.

Targeting the use of seed treatments may be possible if researchers can predict aphid outbreaks using, for example, the regional suction trap network set up in 2005. But for now, we do not have a reliable way to predict the need for seed treatments next year. The bottom line is to understand what seed treatments will do for you, what insects they control and how long they last. Also remember to scout seed-treated fields as well, because they may need to be treated in outbreak years.

Table 1 summarizes three years of fieldwork with seed treatments at MSU, under varying aphid pressure.

**Table 1**

| Seed Treatment Tested   | Planting Date                      | Date, SBA detected in plots [Days after planting] |                    | Date, over the 250 threshold [# SBA / plant] |                                 | Date: Highest SBA count/ plant [# SBA / plant]    |                        | Yield, Bu/acre [* significant]      |              |
|---|------------------------------------|---|--------------------|--|---------------------------------|---|------------------------|-------------------------------------|--------------|
|   |                                    | Un-treated  | Seed-treated       | Un-treated                                   | Seed-treated                    | Un-treated  | Seed-treated           | Un-treated                          | Seed-treated |
| 2003 – cage studies at MSU  |                                    |   |                    |  |                                 |   |                        |                                     |              |
| GaUCHO & Cruiser  | 23 May (Infested w/aphids 16 June) | 23 June [30]                                      | 30 June [37]       | 14 July [1052]                               | 28 July [1039] & 28 July [5749] | Stopped counting after 28 July – too many aphids! |                        | Did not take yield from small cages |              |
| 2004 – field studies at MSU                                       |                                    |   |                    |  |                                 |   |                        |                                     |              |
| GaUCHO & Cruiser  | 19 May                             | 12 July [54]                                      | Never & 2 Aug [75] | Never  | Never                           | 19 July [0.5]                                     | n/a [0] & 16 Aug [1.5] | 67                                  | 68 & 64      |
| Cruiser   | 9 June                             | 29 June [20]                                      | 12 July [33]       | Never  | Never                           | 16 Aug [0.8]                                      | 16 Aug [0.5]           | 61                                  | 63           |
| 2005 – field studies at MSU (GaUCHO) and Saginaw County (Cruiser) |                                    |   |                    |  |                                 |   |                        |                                     |              |
| GaUCHO  | 17 May                             | 7 June [21]                                       | 21 June [35]       | 3 Aug [746]                                  | 3 Aug [905]                     | 3 Aug [746]                                       | 3 Aug [905]            | 57                                  | 61           |
| GaUCHO  | 17 May                             | 7 June [21]                                       | 21 June [35]       | 20 July [368]                                | 27 July [441]                   | 3 Aug [765]                                       | 3 Aug [1391]           | 56                                  | 61           |
| Cruiser   | 10 May                             | 29 June [50]                                      | 29 June [50]       | 13 July [558]                                | 13 July [403]                   | 5 Aug 16,472                                      | 5 Aug 11,048           | 17*                                 | 30*          |

In 2003, cages were used over small plots to generate high aphid pressure. SBA first survived on treated plants 37 days after planting. Seed treated plants went over threshold two weeks later (July 28) than untreated plants (July 14), but aphid numbers on both untreated and treated plants increased rapidly into the thousands. No yield was taken from the small cages.

In 2004, small plot studies were done under natural aphid pressure. Aphid numbers were extremely low throughout the field season. Neither treated nor untreated plots approached threshold, and yields did not differ significantly. Using a seed treatment as “insurance” would not have paid economically in 2004.

In 2005, aphid numbers were higher than in 2004. At two locations on the MSU campus, GaUCHO was included as a treatment. In both studies, GaUCHO protected beans from aphids for two additional weeks compared to the untreated beans, but it started to run out by 35 days after

planting. Untreated and Gaucho-treated plots went over threshold the same week, or shortly thereafter, and aphid numbers increased to moderate levels. By the end of the season, yields did not differ significantly between untreated (56) and Gaucho (61) treated plots. However, when the Gaucho treated plots were sprayed with Trimax (= imidacloprid, not yet registered on soybean), yield improved significantly over the untreated check to 68 bu/ acre, equaling the best foliar treatment in the same field (Asana, also 68 bu/acre)

In a study that included Cruiser at the MSU Bean & Beet Research Farm, aphid populations were tremendous, reaching nearly 17,000 soybean aphid per plant in early August. Treated and untreated plots went over threshold the same week. Cruiser suppressed aphid numbers by about 30% compared to the untreated, and increased yield significantly. However, a single well-timed spray of Warrior (37 bu/acre) outyielded the Cruiser treatment (30 bu/acre). At this location, SBA pressure was so high that it also paid to apply Warrior to Cruiser treated beans (50 bu/acre).

In summary, in years with low aphid populations, we do not see a yield gain (in the absence of other pests) from using a seed treatment. Under heavy aphid pressure, seed treatments do protect yield, but usually will not outperform a single foliar spray timed at 250 SBA per plant. Seed treatments begin to run out after 30-40 days, just as aphid pressure typically increases in most locations in Michigan. However, applying a foliar spray to seed-treated beans over threshold can result in additional yield. In the end, it's a matter of pushing the pencil, figuring the cost of seed treatment vs. spraying vs. doing nothing over a time frame of several seasons. Eventually, researchers hope that aphid numbers in fall suction trap catches may be a great help in making a decision to use a seed treatment the following year.



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