FIELD DAY 2004

Southwest Research–Extension Center

Report of Progress
927

Kansas State University
Agricultural Experiment Station
and Cooperative Extension Service

Southwest Research-Extension Center

SOYBEAN STEM BORER MANAGEMENT TRIALS 2001-2003

by

***Phil Sloderbeck, Larry Buschman, and Randy Higgins*[1]**

SUMMARY

Data from large-scale field plots during a three-year period indicate that properly timed insecticide treatments may be useful in managing the soybean stem borer. Aerial applications of lambda-cyhalothirn were found to control adult beetles for several days, but more than one application may be needed to reduce larval infestations to acceptable levels. Further studies are needed to determine the best methods for sampling beetles, to establish treatment thresholds, and to determine the best timing for treatments. In addition, although lambda-cyhalothrin is labeled for use on soybeans, it is not labeled for this pest. Thus, this remains an experimental practice, and growers and consultants will need to move cautiously when adapting these results into a stem-borer management plan.

INTRODUCTION

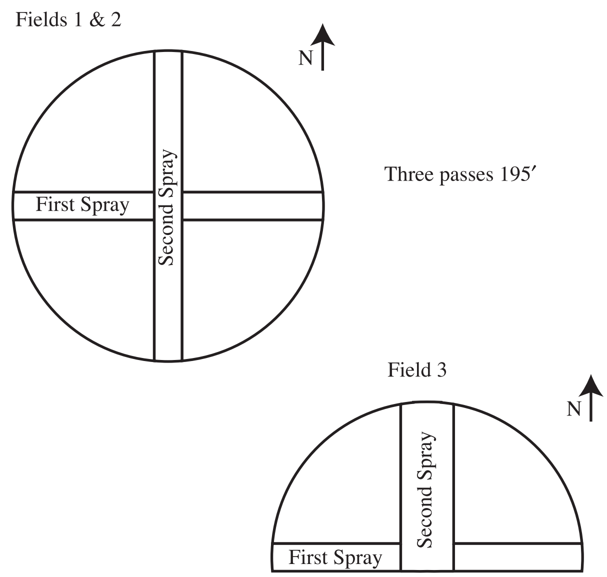
The soybean stem borer (Dectes texanus texanus) is a stem-boring insect pest of soybeans. Although the adults inflict minimal damage, larvae girdle soybean stems internally, causing plants to lodge as physiological maturity is reached.

A series of trials was conducted to determine whether targeting soybean stem-borer adults with an insecticide treatment could reduce soybean stem- borer larval infestations in soybean stems.

PROCEDURES

In 2001, three irrigated circles of soybeans in Pawnee and Edwards counties were identified has having noticeable populations of soybean stem borer adults. Lambda-cyhalothirn at 0.025 lb. ai/a in 3 gpa was applied to strips across these fields by air on 6 and 20 July. Treated strips were three passes wide (195 ft.), with the second treatment applied at 90 degrees to the first treatment, so there was an area of each field that was treated twice and large areas of the fields that were untreated. (Note: one field consisted of only a half of a circle so the second treated strip was six passes wide (390 ft.) (Fig. 1).

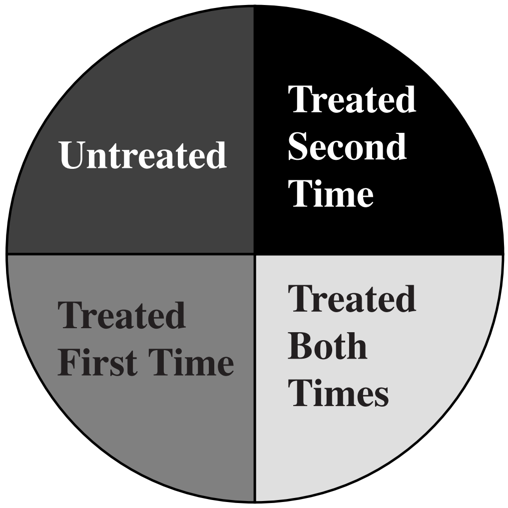
Figure 1. Diagram of treatment design for 2001.



In 2002 and 2003, plots were again established in three center-pivot-irrigated soybean fields in Pawnee County. In these trials, half of each field was treated on each treatment date, with the direction of treatment rotated 90 degrees so that 1/4 of each field was treated twice, 1/4 was treated with the first application, 1/4 was treated with the second application and 1/4 was left untreated (Fig. 2). In 2002, the first treatments were applied on July 12 (except on one field not treated until July 17) and the second treatments were applied on July 24. In 2003, the treatments were made on July 1 and 15. Treatments consisted of 0.023 and 0.025 lb ai/a of lambda-cyhalothirn in 2002 and 2003, respectively, applied in 3 gpa of water by air.

[1]Department of Entomology, Kansas State University.

Figure 2. Diagram of treatment design for 2002 and 2003.

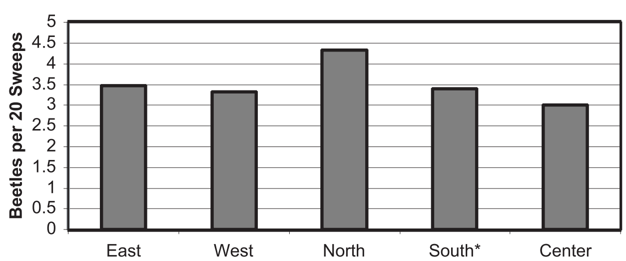


During all three years of the study, beetle populations were sampled before and after treatments by using a sweep net. In addition, at the end of the season, plants were dissected to determine the percentage of plants infested with soybean stem-borer larvae.

RESULTS AND DISCUSSION

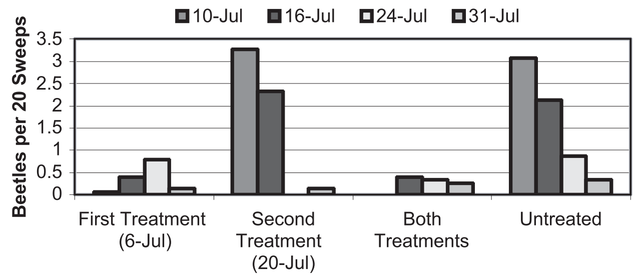
In 2001, pretreatment samples showed fairly uniform distributions of beetles across the fields (Fig. 3) (5 sets of 20 sweeps per location in each field; data from all three fields pooled for presentation in these graphs).

Figure 3. Soybean stem borer efficacy trial, pre-treatment counts, July 2, 2001.



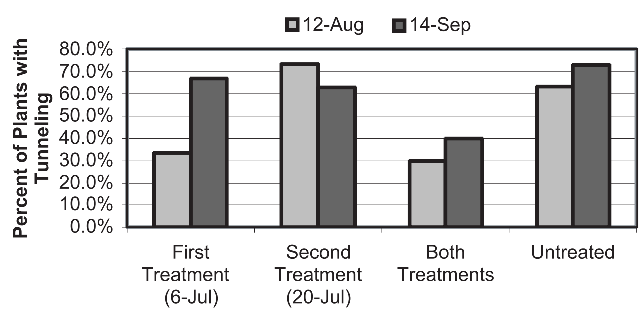
* In field 3, the sample for the south was taken in the middle of the North-South strip.

Figure 4. Soybean stem borer efficacy trial post-treatment samples, 2001.



Treatments showed good initial knockdown, lasting about 2 weeks (Fig. 4). On July 10 (4 days after the first treatment), 5 sets of 20 sweeps were taken in four different areas of each field. In the 600 sweeps from the untreated sections of the fields, a total of 95 beetles were collected, whereas only one bettle was collected in the 600 sweeps from the treated areas. Note that the populations seem to be declining in the untreated soybeans over time. But some of this decline can probably be attributed to the sweep net becoming less efficient over time because the soybeans were growing rapidly. Note; that on July 24, 18 days after the first treatment, beetle numbers in the area that received only the first treatment were nearing the level found in the untreated area.

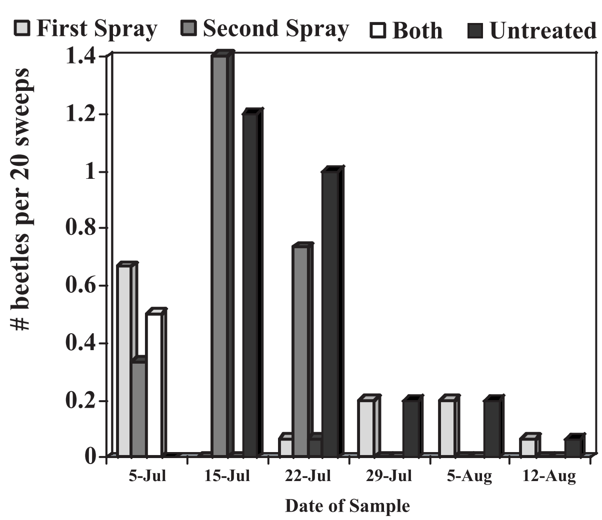
Figure 5. Soybean stem borer efficacy trial, 2001.



Plants were sampled twice for evidence of tunneling from stem-borer larvae (Fig. 5). On August 12, 2 plants at 5 locations in the 4 areas of each field were dissected; on September14, 4 plants were sampled at each location. In the August 12 sample, it seemed that the areas receiving the first treatment and the areas receiving both treatments reduced tunneling by about 50%, but in the September 14 sample, only the areas receiving both treatments showed a noticeable decrease in tunneling. Evidently the August 12 sample missed many larvae that were still tunneling in the leaf petioles.Even with two applications, however, tunneling was reduced by less than 50%. Evidence suggests that the plot size was not large enough to keep beetles from re-infesting the plots. The areas treated with two applications were actually only 195-ft squares in the middle of a 130-acre field. Thus, it was decided redo the trial and use larger treated areas to determine whether that would reduce the chance of the treatments being re-infested with beetles and, thus, increase the chance of showing differences among the treatments.

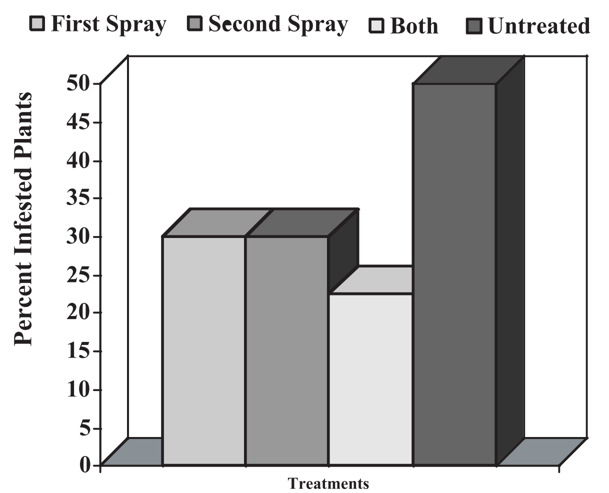
In 2002, there were only two fields in the trial because one of the fields missed being treated on the first spray date. Pretreatment samples (consisting of 3 sets of 20 sweeps per quarter of field) indicated small numbers of beetles across the fields (Fig. 6). After the first treatment (5 sets of 20 sweeps per quarter of field), the numbers of beetles in the treated plots were zero, whereas numbers in the untreated plots, and in the plots that were to receive only the second application (which had not yet been treated), averaged more than 1 beetle per 20 sweeps. Note that in the samples on July 29 and August 5, the number of beetles found in the quarters that were only treated with the first application had rebounded and were the same or greater than in the untreated quarters.

Figure 6. Soybean stem borer efficacy trial, 2002.



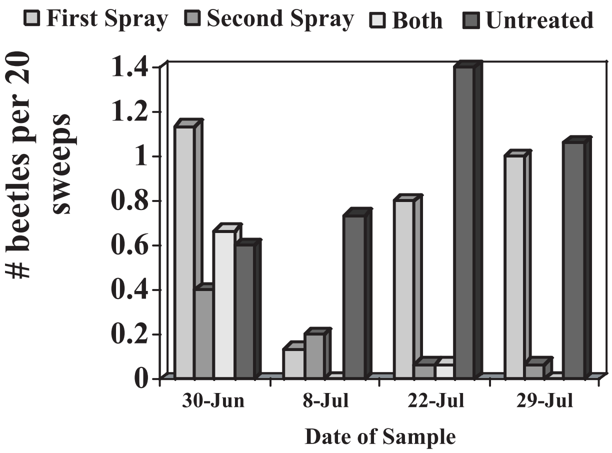
In 2002, samples taken of the larvae in the stems at the end of the season from two fields showed a reduction in larval numbers in the sprayed plots, but not as muchof a reduction in beetle numbers as we would have liked (only about a 50% reduction in larval numbers where the fields were treated twice (Fig. 7). The reason for the limited success of the treatments may have been that the initial treatment was applied later than optimal. Beetles were actually present in samples take on June 28, but numbers were thought to be too small to be meaningful, so treatment was delayed two weeks.. This means that beetles were active in the fields for at least two weeks beforetreatment, which may have allowed for significant egg laying before treatment.

Figure 7. Soybean stem borer efficacy trial, 2002.



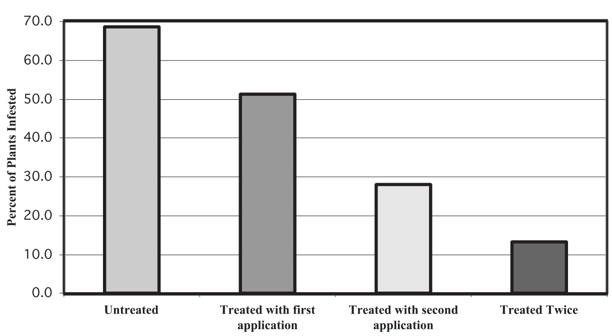
In 2003, samples of beetles were taken by using a sweep net on four different dates. Five sets of 20 sweeps were taken at random in each quarter of each field. Data from all three fields were pooled for presentation (Fig. 8). Pretreatment samples showed small numbers of beetles fairly evenly distributed across the fields, and differences between the different areas of the fields were not significant. On July 8, 7 days after the first treatment, the numbers in the treated plots were less than 0.2 beetles per 20 sweeps, whereas numbers in the untreated portions of the fields averaged more than 0.7 beetles per 20 sweeps, except that the plots that were to be treated with the second application averaged only 0.2 beetles per 20 sweeps, which was fewer than what would have been expected. By July 22, the number of beetles found in the early-treated portions of the fields was starting to rebound. But the populations in the portions of the field treated on July 15 remained very small through the end of July.

Figure 8. Soybean stem borer efficacy trial, 2003.



In September of 2003, five plants at each of 10 locations in each section of each field were dissected to determine if larvae were present. These samples showed a 25% reduction from the July 1 treatment, a 60% reduction with the July 15 treatment, and an 80%
reduction in the percentage of plants infested where the fields were treated twice (Fig. 9).

Figure 9. Soybean stem borer efficacy trial 2003, September 16th, sample (50 plants).



These data indicate that properly timed sprays may be useful in managing the soybean stem borer. But the timing, economics, and treatment thresholds for such applications are not fully understood. Timing of sprays seems to be critical, but sampling for the beetles is labor intensive, and even small populations of beetles (1 beetle per 20 sweeps) seem to result in significant larval infestations. In addition, because well timed multiple applications seem to be needed to reduce larval infestations by more than 50%, the cost of such treatments may be cost prohibitive, especially inasmuch as losses are associated with girdling and lodging, which may not take place if plants can be harvested in a timely manor.

Special thanks to: the Kansas Soybean Commission who provided partial funding for support of this project, and to Syngenta, for providing the insecticide used in this trial. We also thank all of the people who cooperated to make this study possible, including Mike Barton, Tom Threewitt, Doug and Cathy Nord, Eric Fox, Steve Gross, Becky Stubbs, Mark Ploger, and all of the producers who allowed us to sample their fields.

Kansas State University Agricultural Experiment Station and Cooperative Extension Service, Manhattan 66506

SRP 910 **May 2004**

K-State Research and Extension is an equal opportunity provider and employer. 400