Soybean Gall Midge Efficacy Evaluation

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Soybean gall midge, *Resseliella maxima Gagné (Diptera: Cecidomyiidae)*, has the potential to cause 100% yield loss in western Iowa, particularly along field edges. There are three, overlapping generations per season (each approximately 4-6 weeks in duration). Larvae feed inside the stems, making typical management using foliar insecticides, more challenging to use. The purpose of this trial was to compare three rates of a new insecticide, Plinazolin Technology, against two industry standards in soybean. Applications were targeted at the third-generation adults (overwintering population migrating to soybean) in June and July. Product efficacy was evaluated based on larval presence in the stem, percent of wilting plants, and yield.

Materials and Methods

The trial was planted at the Northwest Research and Demonstration Farm on May 16 at 140,000 seeds/acre to a depth of 1 in. Each plot was 30 ft. long and four rows wide, with a 30 in. row spacing. Six treatments were included: untreated control, Plinazolin Technology at 20 grams per acre, Plinazolin Technology at 40 grams per acre, Plinazolin Technology at 60 grams per acre, Endigo 2.06 ZC at 81.2 grams per acre, and Warrior II with Zeon at 35.1 grams per acre. Each treatment was replicated four times in a randomized complete block design. The last two treatments were considered the industry standards. Each product was applied with water as a carrier at a rate of 10 gallons per acre.

Three separate spray applications were made in an effort to suppress the lengthy adult migration period. The first application was timed when plants were at the V3 growth stage (three expanded trifoliates), the first expected arrival of adults. The next two applications occurred at 10-day intervals following the first. Soybean was sprayed June 20, June 30, and July 11, respectively. The middle two rows of each plot were harvested using an ALMACO combine on October 12.

Twice a week, five plants were pulled from the outside two rows of each plot and placed in a plastic bag. Each stem was split open to count all the larvae and the average number of larvae per stem was estimated. Once a week, visual wilting scores were assessed using the zero-to-four scale created by Helton et al. (2022): 0 = no wilting, 1 = 25% of plants wilted, 2 = 50% of plants wilted, 3 = 75% of plants wilted, and 4 = 100% of plants wilted. The larval counts were converted into a seasonal exposure, similar to the cumulative aphid days equation. A cumulative wilting score also was estimated for each plot. Data were analyzed separately using a generalized linear model in SAS 9.4.

Results

Two larval peaks occurred over the season, with the first June 30 and a second August 4 (Figure 1, left axis). One week after each larval peak, there was an increase in wilting scores (Figure 1, right axis). The cumulative larval exposure data indicates Plinazolin Technology was not significantly different than the untreated control plots.

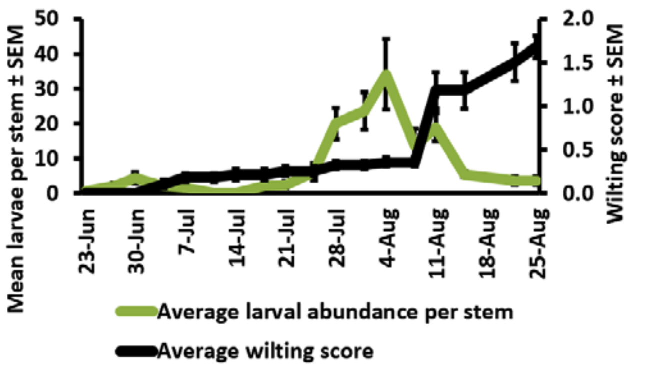

Figure 1. Mean soybean gall midge larvae per stem SEM (standard error of the mean) [left axis] and wilting score SEM [right axis] for untreated control plots in 2022.

The two industry standards did have significantly reduced seasonal exposure compared with the untreated control and Plinazolin Technology (Figure 2).

Cumulative wilting scores show a similar result. The Plinazolin Technology treatments were similar to the untreated control (Figure 3). The Endigo 2.06 EC and Warrior II with Zeon had statistically lower final wilting scores than all other treatments, other than the Endigo 2.06 ZC.

Yield shows all Plinazolin Technology treatments did not differ statistically from the control treatment. The lowest rate of Plinazolin, however, is statistically the same as the Endigo 2.06 EC. The Warrior II with Zeon has the highest yield and is statistically higher than all other treatments, except for the Endigo 2.06 EC, as shown in Figure 4.

Overall, the three rates of Plinazolin Technology did not provide sufficient soybean gall midge suppression. All insecticide treatments resulted in measurable yield losses. In addition, it is likely not feasible to apply an insecticide three times within a growing season. Research on active ingredients, spray timings, etc. will continue to be refined for soybean gall midge.

Acknowledgements

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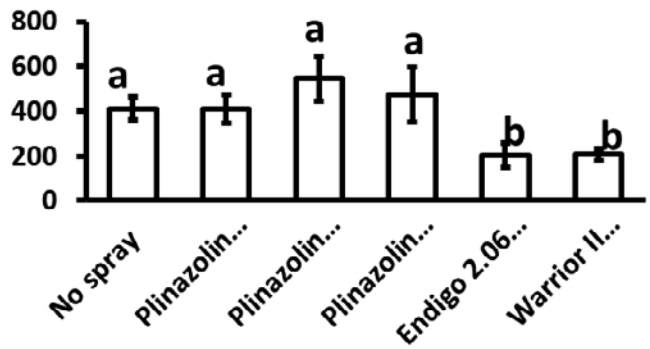

Figure 2. Cumulative larval exposure ± SEM (standard error of the mean) for soybean gall midge treatments in 2022. Different letters indicate significant differences among treatments.

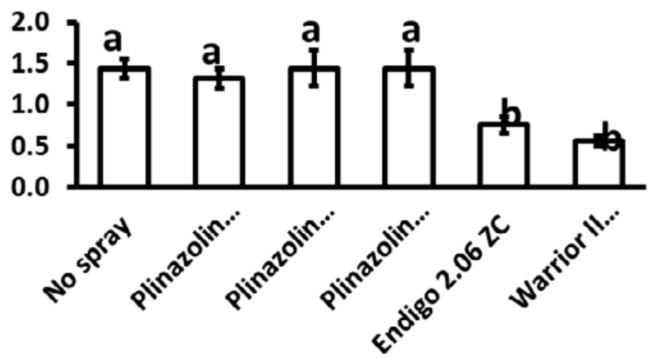

Figure 3. Final wilting scores ± SEM ± SEM (standard error of the mean) for soybean gall midge treatments in 2022. Different letters indicate significant differences among treatments.

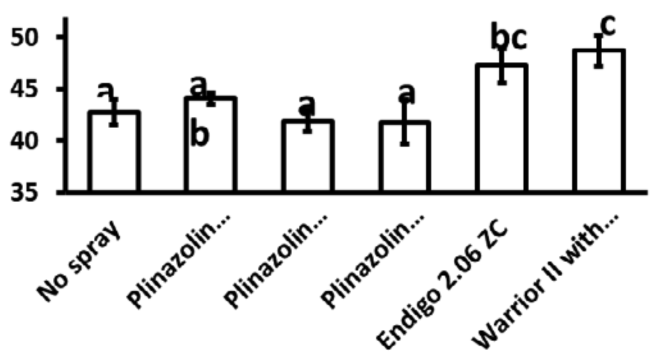

Figure 4. Mean yield in bushels per acre ± SEM (standard error of the mean) for soybean gall midge treatments in 2022. Different letters indicate significant differences among treatments.