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Introduction

Since the arrival of soybean aphid, ***Aphis glycines*** Matsumura, to North America, entomologists have generated considerable research to effectively protect yield in soybean, ***Glycine max*** (L.). Population dynamics of this relatively new pest have been erratic between fields and among years, and timely insecticide applications must be used to prevent severe economic loss. A regional consensus economic threshold was published by Ragsdale et al. (2007):

> An average of 250 aphids per plant on 80% of the field with increasing populations from flowering (R1) through seed set (R5.5).

Insecticides evaluations throughout the midwest were not a common practice twenty years ago; however, efficacy trials for soybean aphid are now in high demand. Conventional products are generally effective in controlling soybean aphid populations, but the broad spectrum killing power is reducing beneficial insect activity in soybean. Recently, new insecticidal chemistries have been developed to target fluid-feeding insects like aphids. Selective products are potentially a good fit for an IPM (integrated pest management) program in soybean.

Spirotetramat is a new chemistry being evaluated in Dr. Matt O'Neal's laboratory (Iowa State University). Spirotetramat is in the class of ketoenole insecticides, which inhibit lipids in insects. This product is effective on a wide range of fluid-feedings insects and is systemically active within the xylem and phloem of the plant. Immature insects that ingest spirotetramat will not be able to complete development.

Thiamethoxam is a newer chemistry that has been used as a seed treatment in soybean (Cruiser). But recently, it has been formulated for a foliar application (Centric). Thiamethoxam is in the class of neonicotinoid insecticides, which interferes with the nervous system of insects. This product is effective against fluid-feeding and chewing insects. Imidacloprid is also a neonicotinoid insecticide that can be applied in soybean as a seed treatment (Gaucho) or as a foliar application tank-mix with cyfluthrin (Leverage).

The objective of this research was to evaluate efficacy of conventional and new chemistries on soybean aphid. A combination of seed treatments and foliar applications were used to gain a better understanding of soybean production profitability.

Materials and methods

Plots and treatments

Small plot research was established at the Iowa State University Northeast Research Farm in Floyd County, Iowa. Plots (6 rows by 50 feet) were planted on 5 May 2009 with Prairie Brand 2636NRR with 30-inch rows into a no-till production system. We present data from 26 treatments including an untreated control and an aphid-free control (Table 1); 17 products were used alone or in combination as seed or foliar application. Each treatment was replicated six times in a randomized complete block design. Foliar treatment applications were made on 6 August 2009. Plots were not harvested before the ICM Proceedings publication deadline, so yield comparisons are not shown.

Sampling

Plots were sampled weekly from May through September. Initially, twenty whole-plants were made for each plot, but gradually counts were reduced to five plants per plot as aphid infestation levels and plant size increased. Actual aphid numbers were averaged between the four replications of each treatment. In addition, cumulative aphid days were estimated for each treatment to reflect seasonal pressure. A sample of cumulative aphid days for different foliar insecticides is shown in Figure 1.

Table 1. List of soybean aphid treatment used in 2009 efficacy evaluations[1]

Treatment and Rate	Time of Application
Untreated control	-----
Aphid-free control, Lorsban Advanced 4 fl oz/A + Warrior II 1.6 fl oz /A	7/23, 8/6, 9/1
Cruiser Max 56.25g and Warrior II 1.6 fl oz /A	seed treatment and 9/1
Endigo 2.8 fl oz/A	8/6
Warrior II 1.9 fl oz/A	8/6
CMT560 5 oz/A + AMS 2 lb/A	8/6
CMT560 6 oz/A + AMS 2 lb/A	8/6
Trilex 6000 and CMT 560 6 oz/A + AMS 2 lb/A	seed treatment and 7/23
Trilex 6000 and CMT 560 6 oz/A + AMS 2 lb/A	seed treatment and 8/6
Trilex 6000 and CMT 560 6 oz/A	seed treatment and 8/6
Trilex 6000 and Leverage 360 3 oz/A + COC 32 fl oz/A +AMS 2 lb/A	seed treatment and 8/6
Trilex 6000 and Leverage 360 3 oz/A + COC 32 fl oz/A + AMS 2 lb/A	seed treatment and 8/6
Asana XL 9.6 fl oz/A	8/6
Hero 8 fl oz/A	8/6
NuFos 16 fl oz/A	8/6
Dimethoate 16 fl oz/A	8/6
Declare 1 fl oz/A	8/6
Declare 1.3 fl oz/A	8/6
Declare 1.5 fl oz/A	8/6
Declare 1.3 fl oz/A + NuFos 24 fl oz/A	8/6
Tombstone Helios 1.6 fl oz/A	8/6
Belay 3 fl oz/A	8/6
Belay 6 fl oz/A	8/6
Lorsban 4E 16 fl oz/A	8/6
Lorsban Advanced 4 fl oz/A	8/6

[1] Mention of a product does not constitute an endorsement or a recommendation by the authors for its use.

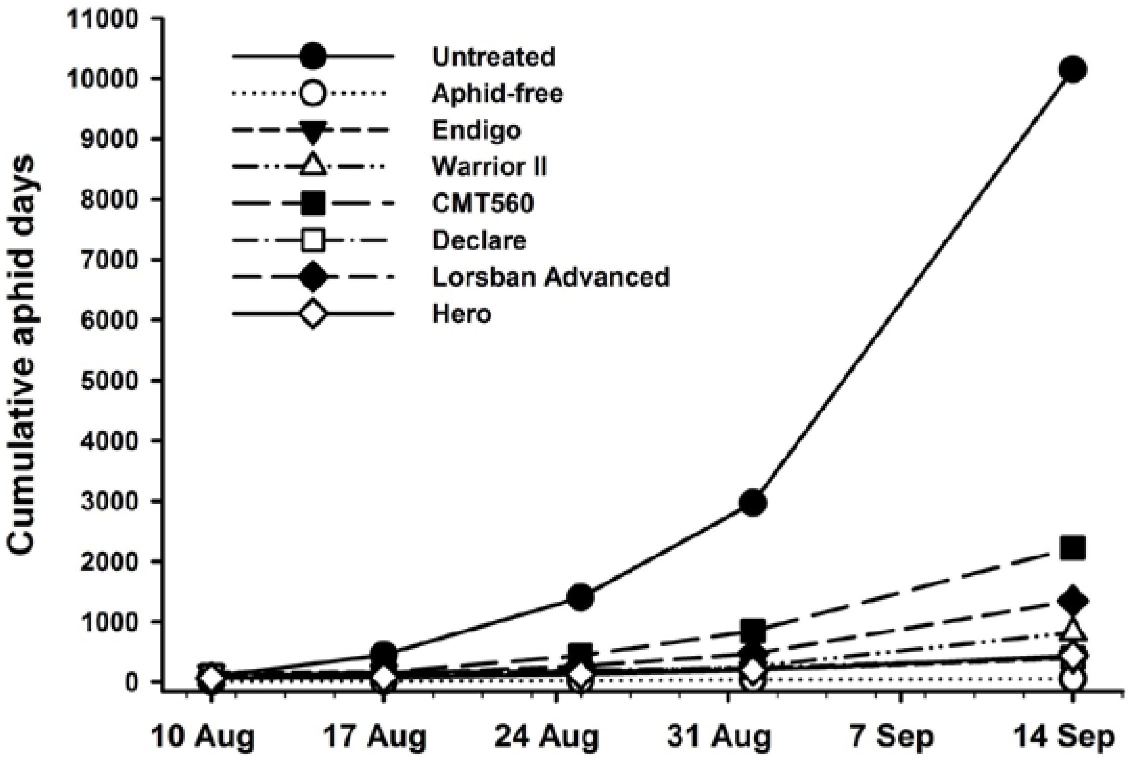

Figure 1. Soybean aphid cumulative aphid days for selected foliar insecticides in 2009.

Statistical analysis

A one-way analysis of variance (ANOVA) was used to assess treatment effects with soybean aphid populations. To compare cumulative aphid days between treatments, log-transformed data was used with a one-way ANOVA. Mean separations for all treatments were estimated by a least significant difference (LSD) test ($P < 0.05$). Different letters in cumulative aphid days or yield indicate significantly different treatment effects. All statistical analyses were performed using SAS software (SAS 2007). Results of the 2009 entire efficacy trial will be discussed at the ICM Conference.

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References

Ragsdale, D. W., B. P. McCornack, R. C. Venette, D. A. Potter, I. V. MacRae, E. W. Hodgson, M. E. O'Neal, K. D. Johnson, R. J. O'Neil, C. D. DiFonzo, T. E. Hunt, P. A. Glogoza, and E. M. Cullen. 2007. Economic threshold for soybean aphid (Homoptera: Aphididae). Journal of Economic Entomology. 100: 1257-1267.

SAS Institute. 2007. SAS/STAT user's guide, version 6.12. SAS Institute, Cary, NC.