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Soybean Aphid Threshold

Ryan Rusk
Iowa State University

Joshua L. Sievers
Iowa State University, sieversj@iastate.edu

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Abstract
Soybean aphid has been a major pest for producers in Northwest Iowa since their first major outbreak in 2003. Control measures for managing this pest are warranted almost every growing season and much research is being done on managing this pest. Insecticide applications have been the sole management technique for soybean aphid and will continue to be important in the future. An economic threshold of 250 aphids/plant is the current threshold level recommended by Iowa State University. This study was conducted to determine if the current recommendations are useful in managing soybean aphid and maintaining profitability for producers.

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Ryan Rusk, farm superintendent
Josh Sievers, ag specialist

Introduction

Soybean aphid has been a major pest for producers in Northwest Iowa since their first major outbreak in 2003. Control measures for managing this pest are warranted almost every growing season and much research is being done on managing this pest. Insecticide applications have been the sole management technique for soybean aphid and will continue to be important in the future. An economic threshold of 250 aphids/plant is the current threshold level recommended by Iowa State University. This study was conducted to determine if the current recommendations are useful in managing soybean aphid and maintaining profitability for producers.

Materials and Methods

Six treatments were compared in this study: spraying when aphids reach 250 aphids per plant (250 aphid), spraying as needed to keep aphids populations near zero (zero aphid), and an unsprayed control (control). These insecticide treatments were all compared in 30-in. row beans and drilled beans. The study had four replications in all three years of the study. Individual plot size was 30 ft wide by 94 ft long.

Kruger 201 RR/SCN soybeans were seeded in 30-in. rows at 178,000 seeds/acre and with a drill at 210,000 seeds/acre. Plots were planted in a tilled seedbed on May 17, 2007, May 14, 2008, and May 14, 2009. Weeds were managed with pre- and post-emergent herbicide applications.

Aphid populations were evaluated weekly throughout the growing season by sampling five plants/plot. Applications of Warrior II insecticide were used to treat aphids in this study. The "zero aphid" plots were sprayed two times in 2007 (July 13 and August 2). The "250 aphid" plots were sprayed on August 2, 2007 at 346 aphids/plant. The "zero aphid" plots were treated three times in 2008 on July 14, July 25, and August 15. The "250 aphid" plots were sprayed on July 25 at 496 aphids/plant. "Zero aphid" plots were sprayed two times in 2009 on July 24 and August 14. The "250 aphid" plots were sprayed on August 14 at 389 aphids/plant.

Harvest was completed October 4, 2007, September 26, 2008, and September 28, 2009. Five rows (12.5 ft) were harvested from the 30-in. row plots and a 12.5-ft wide swath was harvested from the drilled soybean plots. Yields were adjusted to 13 percent moisture and statistical analysis was used to analyze the yield data ($P \leq 0.05$).

Results and Discussion

Soybean aphid populations were high in all years of the study. Peak populations in the control plots were 2,306 aphids/plant on August 14, 2007; 4,094 aphids/plant on August 14, 2008; and 963 aphids/plant on September 10, 2009. Aphid populations remained below threshold in all years after spraying at the "250 aphid" threshold level.

There was a significant yield response each year to the application of insecticide (Table 1). There was an average of 13.7 bushels/acre difference between the sprayed and the unsprayed control plots. There was a slight yield advantage to keeping the aphid populations near zero (1.0 bushels/acre in drilled beans and 1.7 bushels/acre in 30-in. row beans), but this difference was not statistically different in any year of the study (Table 1). The drilled beans yielded

significantly more than the 30-in. row soybeans in 2009, but no other differences were noted between these variables in any other year of the study.

Soybean aphids have the ability to populate soybeans very quickly. We noted an eight-fold increase in population (63/plant to 496/plant) in 2008 in a one-week period. We also saw a ten-fold increase in aphid populations in 2009 as numbers went from 39/plant to 389/plant in one week. These numbers show the importance of weekly scouting of all soybean fields throughout the growing season to manage this pest effectively.

Overall, insecticide applications did an outstanding job of controlling soybean aphid populations and maintaining high yielding soybeans in all years. There was a slight yield advantage to spraying multiple times in the season to keep aphid populations near zero, but this yield difference was not statistically significant and would most likely not be economically feasible. The 250-aphid/plant threshold appears to be useful in managing soybean aphids and maintaining profitability for producers.

Table 1. Impact of soybean aphid management strategy on yield (bushels/acre).[1]

Drilled beans	**2007**		**2008**		**2009**		**Avg**
Control	52.2	a	46.7	a	50.66	a	49.9
250 Threshold	64.4	b	65.4	bc	64.09	c	64.6
Zero Aphid	64.7	b	67.8	c	64.36	c	65.6
30-in. rows	**2007**		**2008**		**2009**		**Avg**
Control	54.1	a	46.3	a	50.19	a	50.2
250 Threshold	64.3	b	62.4	b	58.26	b	61.7
Zero Aphid	66.1	b	65.7	bc	58.32	b	63.4
LSD	4.5		4.4		3.8		

[1]Treatment means with any letter in common are not significantly different (P≤0.05).