



College of Food, Agricultural
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UNIVERSITY OF MINNESOTA

2006- Foliar insecticide effects on soybean aphid and soybean yield.

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Summary

Insecticides were applied to R5 soybeans on August 15. The following compounds were compared to each other and an untreated control: Centric @ 1.5 oz/a, Centric @ 2 oz/a, A13623 @ 2.05 fl. oz./a, A13623 @ 2.74 fl. oz./a, Warrior @ 2.56 fl. oz./a, Warrior @ 3.2 fl. oz./a, Mustang Max @ 4 fl. oz./a, F6113 @ 5.12 fl. oz./a, Asana XL @ 6.4 fl. oz./a, Asana XL @ 9.6 fl. oz./a, Lorsban 4E @ 16 fl. oz./a, and Orthene 97 @ 0.75 lbs./a. Soybean aphid populations were uniform and averaged 146 aphids / plant. Soybean aphid populations were evaluated by counting aphids on 5 plants/plot 3, 7 and 14 days after application (DA-A) after which aphid populations collapsed. Across all assessment dates all compounds had fewer aphids than the untreated control. At 3 DA-A the 2 oz. rate of A13623, F6113 and Lorsban 4E had fewer aphids than other compounds. At 7 and 14 DA-A, both rates of A12623 both rates of Warrior, F6113, and Lorsban 4E were the best performing. Minimal aphid immigration occurred in this trial after application and differences in control are related to initial control. As expected with low soybean aphid populations, yield differences were not observed in this trial.

Background

Soybean aphid has been a chronic pest in SW Minnesota since 2003. Many compounds have been shown to provide good control of soybean aphid. In some trials, several synthetic pyrethroid compounds have shown delayed mortality with longer duration of control while chlorpyrifos has shown quicker mortality but less persistence. In some cases, growers have been hesitant to allow low level aphid populations to exist because of fear of yield loss. This trial was implemented to evaluate several widely used and lesser tested products under an additional unique combination of soybean aphid population and environmental conditions.

Objective

This trial was designed to examine: 1) Insecticide effects on soybean aphid populations, 2) Effect of late season insecticide applications to soybean yield and 3) Effect of chronic low level soybean aphid populations on soybean yield.

Site and application description

The trial was planted at the University of Minnesota, Southwest Research and Outreach Center near Lamberton, Redwood County, Minnesota. Site and treatment application details are shown in table 1 and 2 respectively. Early season weather was cool and very wet, leading to delayed planting. The latter part of the season was normal to dry. Detailed temperature and rainfall information for this trial can be found at: <http://swroc.coafes.umn.edu/Weather/weather.htm>.

Methods

This trial was located in a soybean field bulk planted May 19 using a 6-row, 30-inch John Deere MaxEmerge II vacuum planter. A late group 1, Roundup Ready, SCN resistant soybean variety, Pioneer 91M91, was planted at 165,000 seeds/acre at a 1 ½ inch depth. Pre and Post emerge weed control was also applied as a blanket treatment across all plots.

Six-row x 30 foot plots were measured and alley ways tilled prior to fungicide applications. Plots were aligned to correspond to the planter. A Tractor mounted 10-foot offset boom sprayer (R& D Sprayers, Opelousas, LA) modified to use compressed air was used to apply all insecticide treatments. 8003 XR flat fan nozzles on 18-inch spacing were operated at 20 PSI and 20 GPA spray volume. On August 15, 2006, at the R5 soybean growth stage, insecticide applications were applied to rows 2 through 5 leaving a 2 row untreated border between individual plots for driving and minimization of drift. Soybean aphid populations were approximately 150 aphids/ plant at time of application. Soybean aphid populations were increasing but still below the generally accepted economic threshold of 250 soybean aphids/ plant through R5.

Soybean aphid populations were assessed based on counting the aphids on 5 randomly selected soybean plants/ plot. Aphids were assessed 3, 7 and 14 days after application (DA-A).

Plots were end trimmed to harvest length and harvested with a plot combine on October 3, 2006. Residue treated with unregistered products was destroyed,

Table 1. Plot information

Site information	
Location:	University of Minnesota Southwest Research & Outreach Center
County:	Redwood Nearest Town: Lamberton, MN
Soil type:	Ves Clay Loam
Fertility:	P(Bray): 17 ppm K: 199 ppm pH: 5.6 O.M.% 4.0
Applied Fertilizer:	April 14, 2006 23-60-60 broadcast
Plot design:	Randomized Complete Block with 4 replications
Plot size:	10 foot x 30 foot
Plot Maintenance	
Previous crop:	Corn
Primary tillage:	Fall 2005 Mulch Till Soil saver
Secondary tillage:	5/18/2006 Field cultivator 2X
Planting date:	May 19, 2006 Row spacing: 30 inch
Seeding rate:	165,000 Seeding depth: 1.5 inches
Planting equipment:	John Deere MaxEmerge II
Cultivar:	Pioneer 91M91 Trait(s): Roundup Ready SCN resistant (Peking)
Weed control:	PPI May 18, 2006 2.5 pts/acre Prowl H2O POST June 20, 2006 1.5 pts/acre Touchdown Total + AMS
Disease control:	None
Insect control:	Part of trial

Table 2. Treatment application information

	A
Date:	8/15/2006
Wind:	3.7 mph max
Temperature:	82 F
Relative humidity %	56
Crop stage:	R5
Crop height:	40"
Volume:	20 GPA
Pressure:	40PSI
Nozzle:	8003XR
Nozzle spacing:	18"
Boom height:	18 inches above canopy
Compressed air offset boom sprayer (R &D sprayers modified)	

Results and discussion

Aphids in this trial were at chronic low levels (40-100 aphids/plant) after mid-July with a reduction of aphid populations from emigration of alates (winged aphids) in late July. In all but the untreated control, soybean aphids were assumed to be controlled well in advance of yield loss and populations remained very low for the remainder of the growing season. Bean leaf beetle, grasshopper and other pest insect populations remained low. Weed control was also acceptable.

Significant fungal root rots were observed in all treatments early and mid-season but root systems had recovered by late season. SCN females were observed on root systems at low numbers and plant symptoms were not observed within the trial.

Soybean yields adjusted to 13% moisture and soybean aphid assessment data are shown in Table 3.

No yield differences by treatment or moisture (data not shown) were observed.

Soybean aphid populations were evaluated by counting aphids on 5 plants/plot 3, 7 and 14 days after application (DA-A) after which aphid populations collapsed.

Although aphid populations were very uniform at the time of application, this soon changed. Soybean aphid populations became increasingly over dispersed. This appeared to due to emigration rather than insecticide drift. Therefore, these aphid data were transformed for analysis.

Across all assessment dates all compounds had fewer aphids than the untreated control. At 3 DA-A, the 2 fl. oz. rate of A13623, F6113 and Lorsban 4E had few aphids than other compounds. At 7 and 14 DA-A, both rates of A12623, both rates of Warrior, F6113, and Lorsban 4E were the best performing. Minimal aphid immigration occurred in this trial after application and differences in control are related to initial control.

As expected with low soybean aphid populations, yield differences were not observed in this trial. Although aphid populations in the untreated control did exceed 250 soybean aphids/plant accumulated aphid days were under 4,000. Additionally, the greatest aphid density occurred during and after R5. These data suggests that treating soybean aphids

before economic threshold is reached may not be economical and indicate that more conservative late season aphid action thresholds might be appropriate.

Acknowledgments:

The information given in this publication is for educational purposes only. Reference to commercial products is made with the understanding that no discrimination is intended and no endorsement by the University of Minnesota any specific product(s) used in this implied.

A13623
Syngenta Crop Protection, Inc
Not currently registered on soybeans

Asana® XL
® Registered trademark of E.I . du Pont de Nemours and Company

Centric®
Registered trademark of Syngenta Crop Protection, Inc.
Not currently registered on soybeans

F6113
FMC Corporation
Not currently registered on soybeans

Lorsban® 4E
® Registered trademark of Dow AgroSciences, LLC

Mustang Max™
FMC Corporation

Orthene97®
FMC Corporation

Prowl H2O®
BASF Corporation

Touchdown Total ®
Syngenta Crop Protection

Warrior®
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Table 3. The effect of foliar applied insecticides on soybean aphid and yield. University of Minnesota – Southwest Research and Outreach Center, Lamberton, MN. (2006) B. D. Potter

Treatment	8/14/2006 SBA /plant R5 1DB-A	8/18/2006 SBA /plant R5 3 DA-A	8/22/2006 SBA /plant R5-6 7 DA-A	8/29/2006 SBA /plant R6 14 DA-A	10/3/2006 YIELD bu/ac @ 13 %
1 Untreated check	146	319.6 a	339.7 a	233.4 a	53.6 a
2 CENTRIC 1.5 oz/a		22.5 b	10.3 b	4.1 cd	54.6 a
3 CENTRIC 2 oz/a		24.6 b	9.4 b	7.1 bc	55.3 a
4 A13623 2.05 fl oz/a		13.6 b	1.6 bcd	0.0 e	57.1 a
5 A13623 2.74 fl oz/a		2.2 c	0.4 cd	0.2 de	55.7 a
6 WARRIOR W/ZEON 1CS 2.56 fl oz/a		75.7 b	3.4 bcd	0.1 e	53.3 a
7 WARRIOR W/ZEON 1CS 3.2 fl oz/a		16.1 b	3.4 bcd	0.0 e	55.0 a
8 MUSTANG MAX 0.8 EC 4 fl oz/a		54.4 b	21.8 b	24.6 b	54.3 a
9 F6113 5.12 fl oz/a		1.6 c	0.1 d	0.0 e	55.8 a
10 ASANA XL 6.4 fl oz/a		21.3 b	11.5 bc	3.1 cd	54.1 a
13 ASANA XL 9.6 fl oz/a		45.3 b	13.7 b	4.5 bc	54.7 a
11 LORSBAN 4E 16 fl oz/a		0.5 c	0.2 d	0.2 de	53.0 a
12 ORTHENE 97 0.75 lb/a		37.2 b	7.0 b	7.0 bc	55.6 a
LSD (P=.05)		*	*	*	4.13
CV		27.08	57.68	59.63	5.27
Prob(F)		0.0001	0.0001	0.0001	0.8084
Means followed by same letter do not significantly differ (P=.05, Duncan's New MRT)					
* = Mean transormations based on log(SBA/5 plants)					
Mean comparisons performed only when AOV Treatment P(F) is significant at mean comparison OSL.					