2015

Soybean Aphid Efficacy Screening Program, 2014

Erin W. Hodgson
Iowa State University, ewh@iastate.edu

Greg VanNostrand
Iowa State University, gregvn@iastate.edu

Soybean Aphid Efficacy Screening Program, 2014

Abstract

Soybean aphid, *Aphis glycines* Matsumura, has drastically changed soybean pest management in the North Central region. To date, SBA can be successfully managed by timely scouting and foliar insecticides. Host plant resistance is the newest soybean aphid management tool and is complementary to the existing chemical control. In 2014, we established plots at two Iowa State University Research Farms (Northeast and Northwest) on 24 May and 22 May, respectively. NK S25-E5 soybean variety was used for all the soybean aphid-susceptible treatments, and LD09-05484A soybean variety was used for the *Rag1*-containing treatments. Plots were arranged in an RCB design with four replications. Each plot was six rows in width and 50 ft in length. Treatments containing a seed treatment were applied by Syngenta. For the Northeast location, foliar treatments were applied using a backpack sprayer and TeeJet twinjet nozzles (TJ 11002) (Springfield, IL) with 20 gpa at 40 lb psi. Foliar applications were made on 22 Aug when plants were in the R5 growth stage. For the Northwest location, foliar treatments were applied using a custom sprayer and TeeJet flatfan nozzles (TJ 8002) (Springfield, IL) with 15.5 gpa at 40 lb psi. All foliar applications at this site were made 14 Aug when plants were in the R4 growth stage. Soybean aphids were counted on randomly selected whole plants within each plot. To estimate the total exposure of soybean plants to soybean aphid, we calculated cumulative aphid days (CAD) based on the number of aphids per plant counted on each sampling date. Yields (bushels/acre) were determined by weighing grain with a hopper and corrected to 13% moisture. One-way ANOVA was used to determine treatment effects within each experiment. Means separation for all studies was achieved using a least significant difference test ($\alpha = 0.10$). All statistical analyses were performed using SAS software.

Disciplines

Entomology

Comments

This article is from *Arthropod Management Tests* 40 (2015): F11, doi:10.1093/amt/tsv138. Posted with permission.

Rights

Arthropod Management Tests, 2015, 1–3
doi: 10.1093/amt/tsv138
(F11)

SOYBEAN: *Glycine max* L.

Soybean Aphid Efficacy Screening Program, 2014*

Erin W. Hodgson[1] and Greg VanNostrand

Department of Entomology, Iowa State University, 103 Insectary Bldg., Ames, IA 50011-3140, Phone: 515.294.2847, Fax: 515.294.7406 (ewh@iastate.edu; gregvn@iastate.edu) and [1]Corresponding author, e-mail: ewh@iastate.edu

Subject Editor: Clyde Sorenson

Soybean | Glycine max

soybean aphid | *Aphis glycines*

(*S*)-cyano (3-phenoxyphenyl) methyl (α*S*)-4-chloro-α-(1-methylethyl) benzeneacetate; methyl (αE)-α-(methoxymethylene)-2-[[[6-(trifluoromethyl)-2-pyridinyl]oxy]methyl]benzeneacetate; (*R*)-cyano(3-phenoxyphenyl) methyl (1*S*,3*S*)-*rel*-3-[(1*Z*)-2-chloro-3,3,3-trifluoro-1-propen-1-yl]-2,2-dimethyl cyclopropanecarboxylate; 3-bromo-4′-chloro-1-(3-chloro-2-pyridyl)-2′-methyl-6′-(methylcarbamoyl)pyrazole-5-carboxanilide; (2-methyl[1,1′-biphenyl]-3-yl)methyl (1R,3R)-rel-3-[(1Z)-2-chloro-3,3,3-trifluoro-1-propenyl]-2,2-dimethylcyclopropanecarboxylate; *O*,*O*-diethyl *O*-(3,5,6-trichloro-2-pyridinyl) phosphorothioate; (*S*)-cyano(3-phenoxyphenyl) methyl (1*R*,3*R*)-3-[(1*Z*)-2-chloro-3,3,3-trifluoro-1-propen-1-yl]-2, 2-dimethylcyclopropane; Carboxylate; 3-[(2-chloro-5-thiazolyl) methyl]tetrahydro-5-methyl-*N*-nitro-4*H*-1,3,5-oxadiazin-4-imine; methyl *N*-(2,6-dimethylphenyl)-*N*-(methoxyacetyl)-D-alaninate; 4-(2,2-difluoro-1,3-benzodioxol-4-yl)-1H-pyrrole-3-carbonitrile; O,O-dimethyl S-[2-(methylamino)-2-oxoethyl] dithiophosphate; N-[[(4-chlorophenyl)amino]carbonyl]-2,6-difluorobenzamide; *R*)-cyano(3-phenoxyphenyl) methyl (1*S*,3*S*-*rel*-3-[(1*Z*)-2-chloro-3,3,3-trifluoro-1-propen-1-yl]-2,2-dimethyl cyclopropanecarboxylate; 3-[(2-chloro-5-thiazolyl) methyl]tetrahydro-5-methyl-*N*-nitro-4*H*-1,3,5-oxadiazin-4-imine; methyl [2-[[[1-(4-chlorophenyl)-1H-pyrazol-3-yl]oxy]methyl]phenyl]methoxycarbamate; (2-methyl[1,1′-biphenyl]-3-yl)methyl (1R,3R)-rel-3-[(1Z)-2-chloro-3,3,3-trifluoro-1-propenyl]-2,2-dimethylcyclopropanecarboxylate; (S)-cyano(3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate; (2E)-1-[(6-chloro-3-pyridinyl)methyl]-N-nitro-2-imidazolidinimine; cyano (4-fluoro-3-phenoxyphenyl)methyl 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate; *O*,*O*-diethyl *O*-(3,5,6-trichloro-2-pyridinyl) phosphorothioate; 1-acetyl-3,4-dihydro-3-[(3-pyridinylmethyl)amino]-6-[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethyl]-2(1H)-quinazolinone; O,S-dimethyl acetylphosphoramidothioate; (*R*)-cyano(3-phenoxyphenyl) methyl (1*S*,3*S*)-*rel*-3-[(1*Z*)-2-chloro-3,3,3-trifluoro-1-propen-1-yl]-2,2-dimethyl cyclopropanecarboxylate; 3-[(2-chloro-5-thiazolyl) methyl]tetrahydro-5-methyl-*N*-nitro-4*H*-1,3,5-oxadiazin-4-imine; methyl (αE)-2-[[6-(2-cyanophenoxy)-4-pyrimidinyl]oxy]-α-(methoxymethylene)benzeneacetate; 1-[[2-(2,4-dichlorophenyl)-4-propyl-1,3-dioxolan-2-yl]methyl]-1H-1,2,4-triazole; methyl (αE)-2-[[6-(2-cyanophenoxy)-4-pyrimidinyl]oxy]-α-(methoxymethylene)benzeneacetate; 1-[[2-(2,4-dichlorophenyl)-4-propyl-1,3-dioxolan-2-yl]methyl]-1H-1,2,4-triazole; N-[methyloxido[1-[6-(trifluoromethyl)-3-pyridinyl]ethyl]-λ4-sulfanylidene]cyanamide; (*R*)-cyano(3-phenoxyphenyl) methyl (1*S*,3*S*)-*rel*-3-[(1*Z*)-2-chloro-3,3,3-trifluoro-1-propen-1-yl]-2,2-dimethyl cyclopropanecarboxylate; N-[methyloxido[1-[6-(trifluoromethyl)-3-pyridinyl]ethyl]-λ4-sulfanylidene]cyanamide; N-[2-[1,1′-bicyclopropyl]-2-ylphenyl]-3-(difluoromethyl)-1-methyl-1H-pyrazole-4-carboxamide; (*R*)-cyano(3-phenoxyphenyl) methyl (1*S*,3*S*)-*rel*-3-[(1*Z*)-2-chloro-3,3,3-trifluoro-1-propen-1-yl]-2,2-dimethyl cyclopropanecarboxylate

Soybean aphid, *Aphis glycines* Matsumura, has drastically changed soybean pest management in the North Central region. To date, SBA can be successfully managed by timely scouting and foliar insecticides. Host plant resistance is the newest soybean aphid management tool and is complementary to the existing chemical control. In 2014, we established plots at two Iowa State University Research Farms (Northeast and Northwest) on 24 May and 22 May, respectively. NK S25-E5 soybean variety was used for all the soybean aphid-susceptible treatments, and LD09-05484A soybean variety was used for the *Rag1*-containing treatments. Plots were arranged in an RCB design with four replications. Each plot was six rows in width and 50 ft in length. Treatments containing a seed treatment were applied by Syngenta. For the Northeast location, foliar treatments were applied using a backpack sprayer and TeeJet twinjet nozzles (TJ 11002) (Springfield, IL) with 20 gpa at 40 lb psi. Foliar applications were made on 22 Aug when plants were in the R5 growth stage. For the Northwest location, foliar treatments were applied using a custom sprayer and TeeJet flatfan nozzles (TJ 8002)

* This research was supported by industry gifts of seed, product, and research funding.

Table 1

Treatment/formulation[a]	Rate[b]	CAD	Yield, bu/ac
Untreated check	—	1266.26BCD	57.69EF
CruiserMaxx Vibrance 6.77FS	62.5 g/100 kg	599.89ABC	58.74BCDEF
Warrior II 2.08CS	1.92 fl oz	372.60A	60.01ABCDE
Warrior II 2.08CS	1.6 fl oz	352.15A	58.72BCDEF
Lorsban Advanced 3.76EC	16.0 fl oz	459.51ABC	58.91ABCDEF
Warrior II 2.08CS +	1.92 fl oz	1280.77CD	59.75ABCDE
Lorsban Advanced 3.76EC	16.0 fl oz		
Endigo ZCX 2.71SC	4.5 fl oz	345.91A	60.54ABCD
Quilt Xcel 2.2SE	14.0 fl oz	687.28ABCD	59.93ABCDE
Quindigo 3.15ZE	14.0 fl oz	192.64A	60.19ABCDE
Cygon 4E	8.0 fl oz	271.73A	61.49A
Cygon 4E	16.0 fl oz	399.83ABC	59.14ABCDEF
Asana XL 0.66EC	9.6 fl oz	387.59AB	60.90ABC
Asana XL 0.66EC +	9.6 fl oz	297.60A	60.13ABCDE
Aproach 2.08SC	6.0 fl oz		
Seeker 2.09SE	2.1 fl oz	1496.00D	61.10AB
Seeker 2.09SE	2.6 fl oz	407.35ABC	60.21ABCDE
Transform 50WG	1.0 oz	364.29A	57.94DEF
DoubleTake 3SC	4.0 fl oz	850.38ABCD	58.48CDEF
Hero 1.24EC	5.0 fl oz	488.99ABC	58.02DEF
Pyrifluquinazon SC	0.8 fl oz	287.50A	58.59BCDEF
Pyrifluquinazon SC	1.6 fl oz	981.65ABCD	57.06F
Pyrifluquinazon SC	2.4 fl oz	561.47ABC	59.78ABCDE
Leverage 360 3SC	2.8 fl oz	263.62A	59.58ABCDEF
Leverage 360 3SC +	2.8 fl oz	481.22ABC	60.15ABCDE
Headline 2.09EC	12.0 fl oz		
Brigade 2EC	3.0 fl oz	949.79ABCD	59.51ABCDEF
Headline 2.09EC	12.0 fl oz	389.07AB	61.44A
Orthene 97 ST	1 lb	179.63A	59.12ABCDEF
Cobalt Advanced 2.63EC	26.0 fl oz	241.63A	60.45ABCD
Rag1	—	83.63a	44.82b
Rag1 +	—	132.67a	47.46ab
Cruiser 5FS	0.0756 g		
Rag1 and	—	51.11a	48.74a
Cruiser 5FS +	0.0756 g		
Warrior II 2.08CS	1.92 fl oz		
Rag1 +	—	99.54.45a	45.42ab
Warrior II 2.08CS	1.92 fl oz		

Means within columns not followed by the same letter are significantly different. Least significant difference for mean separation of cumulative aphid days (CAD) (susceptible seed: $P < 0.5429$; $F = 0.95$; df = 26, 3 and *Rag1* seed: $P < 0.8419$; $F = 0.43$; df = 3, 3). Least significant difference for mean separation of yield (susceptible seed: $P < 0.0001$; $F = 6.44$; df = 26, 3 and *Rag1* seed: $P < 0.0013$; $F = 10.38$; df = 3, 3).

[a] Formulations are given in pounds of active ingredient per gallon of product for liquids and in percent active ingredient for solids.

[b] Foliar product rates are given as formulated product per acre, and seed treatments are given as grams active ingredient per 100 kg seed.

(Springfield, IL) with 15.5 gpa at 40 lb psi. All foliar applications at this site were made 14 Aug when plants were in the R4 growth stage. Soybean aphids were counted on randomly selected whole plants within each plot. To estimate the total exposure of soybean plants to soybean aphid, we calculated cumulative aphid days (CAD) based on the number of aphids per plant counted on each sampling date. Yields (bushels/acre) were determined by weighing grain with a hopper and corrected to 13% moisture. One-way ANOVA was used to determine treatment effects within each experiment. Means separation for all studies was achieved using a least significant difference test ($\alpha = 0.10$). All statistical analyses were performed using SAS software.

There were low CADs at both locations in 2014. At the Northeast location, soybean aphids in the untreated check plots averaged 305 per plant three days prior to the 22 Aug application and that was also their peak population for the season. The untreated check had 1,266 CADs and was not significantly different than the seed treatment. There were significant reductions in aphids with some of the foliar insecticides versus the untreated check (Table 1). There was some variability in yield between treatments, but most products labeled for soybean aphid were not statistically different. The *Rag1*-containing treatments did suppress CAD; however, adding a foliar insecticide or seed treatments did not significantly improve yield (Table 1). At the Northwest farm, Soybean aphid populations in the untreated check plots averaged 21 per plant 1 d prior to the 14 Aug application and peaked on 5 Aug at 47 aphids per plant. The untreated check had the most CAD compared to all other treatments but was not significantly different than most foliar insecticides. There was not a significant reduction in aphids with most foliar insecticides versus the untreated check (Table 2). Yield between treatments varied slightly, but most foliar insecticides were not statistically different. The *Rag1*-alone treatment did not have significantly more aphids than other *Rag1*-containing insecticide treatments, and the yield was not significantly reduced.

Table 2

Treatment/formulation[a]	Rate[b]	CAD	Yield, bu/ac
Untreated check	—	514.92B	66.65AB
CruiserMaxx Vibrance 6.77FS	62.5 g/100 kg	376.15AB	68.30AB
Warrior II 2.08CS	1.92 fl oz	290.25AB	65.36B
Lorsban Advanced 3.76EC	16.0 fl oz	358.56AB	65.91B
Warrior II 2.08CS+	1.92 fl oz	196.99A	66.77AB
Lorsban Advanced 3.76EC	16.0 fl oz		
Leverage 360 3SC	2.8 fl oz	377.79AB	66.81AB
Brigade 2EC	3.0 fl oz	334.43AB	69.72A
Orthene 97 ST	1 lb	393.00AB	65.75B
Cobalt Advanced 2.63EC	26.0 fl oz	415.13AB	67.08AB
Leverage 360 3SC +	2.8 fl oz	271.08AB	67.41AB
Headline 2.09EC	12.0 fl oz		
Headline 2.09EC	12.0 fl oz	410.35AB	64.83B
Besiege 1.25ZC	9.0 fl oz	335.72AB	68.08AB
Rag1	—	20.08a	68.60b
Rag1 +	—	11.32a	68.88b
Cruiser 5FS	0.0756 g		
Rag1 +	—	49.71a	71.43a
Cruiser 5FS +	62.5 g		
Warrior II 2.08CS	0.0756 g		
Rag1 +	—	53.26a	70.24ab
Warrior II 2.08CS	1.92 fl oz		

Means within columns not followed by the same letter are significantly different. Least significant difference for mean separation of CAD (susceptible seed: $P < 0.0001$; $F = 9.23$; df = 7, 3 and *Rag1* seed: $P < 0.0054$; $F = 6.97$; df = 3, 3). Least significant difference for mean separation of yield (susceptible seed: $P < 0.0032$; $F = 4.08$; df = 7, 3 and *Rag1* seed: $P < 0.189$; $F = 1.88$; df = 3, 3).

[a] Formulations are given in pounds of active ingredient per gallon of product for liquids and in percent active ingredient for solids.

[b] Foliar product rates are given as formulated product per acre, and seed treatments are given as grams active ingredient per 100 kg seed.