# Comparisons of Prism®, Trilogy®, Baythroid® XL, and Steward® for Control of Summer Alfalfa Insects

*Michael D. Rethwisch, Anna Grimm and Michael T. Williams*

**Abstract**

*Three insecticides and one herbicide (Prism®) were evaluated efficacy against summer alfalfa insects using small plots. Usage of the insecticide Steward® resulted in excellent control of alfalfa caterpillars and beet armyworms, as well as excellent initial control of Empoasca leafhoppers. Usage of Steward® also reduced nymphal lygus bugs, but also resulted in lowest numbers of bigeyed bugs. Application of the insecticide Baythroid® XL was noted to result in excellent control of Empoasca leafhoppers throughout the study, excellent control of palestriped flea beetles early in the study, but also reduced populations of damsel bugs early in the study. Reduction of threecornered alfalfa hoppers was also noted, as was excellent control of alfalfa caterpillars at one and seven days post treatment with this chemistry, although this was not noted at four days after treatment. Data indicate the herbicide treatment (Prism® + Hasten®) significantly reduced damsel bug populations and large lygus bug nymphs for one day post treatment, and resulted in a slight numerical decrease in beet armyworms and palestriped flea beetles. Clover leafhopper numbers where higher at seven days post treatment in alfalfa receiving this treatment than the untreated check. Application of Trilogy®, expected to be a slow acting treatment, did result in some slight initial reductions (25%) of palestriped flea beetles, threecornered alfalfa hoppers and beet armyworms, but these reductions were not apparent at four days post treatment. Usage of Trilogy® resulted in highest Empoasca leafhopper populations at seven days post treatment, although the reason for this observation is unknown.*

## Introduction

A number of insects are prevalent in summer alfalfa in the low desert, including alfalfa caterpillars *Eurytheme colias*, beet armyworms *Spodoptera exigua*, lygus bugs, and occasionally *Empoasca* spp. leafhoppers and pale striped flea beetles. These are also accompanied by numerous insect species that are effective biological control agents.

Alfalfa caterpillars can occasionally appear in high numbers in summer alfalfa in the low deserts of the southwestern United States. The summer of 2006 saw widespread infestations of this insect following temperatures that exceeded 120 F for consecutive days in mid-July. This insect is fairly easily controlled in comparison with beet armyworms, so much so that some questions have arisen if herbicides applied during the summer for grass control in alfalfa might even have some activity. This experiment was initiated to document potential activity of such a grass herbicide (Prism) and compare it with and document efficacy of other alfalfa insecticide products against insects found during summer alfalfa production in the low desert.

## Methods and Materials

An alfalfa field (variety SW9628) experiencing high alfalfa caterpillar populations with resultant alfalfa defoliation was located near Bythe, CA. Treatments were applied the morning of July 30, 2006, with a backpack sprayer calibrated to deliver 23.4 gallons/acre. Treatments consisted of the insecticides Baythroid® XL (active ingredient = cyfluthrin, Bayer CropScience), Trilogy® (clarified neem oil extract; Certis, USA) at 1 qt/acre, Steward® (active ingredient = indoxycarb, DuPont), and the herbicide Prism® (active ingredient = clethodim, Valent USA) at 14 oz/acre with the methylated seed oil Hasten® (Wilbur Ellis Co.) added at 1 pt/100 gallons. Plots were 25 ft long by 7 foot wide. A randomized complete block design was used, resulting in four replications of each treatment.

Alfalfa averaged 9.2 inches in height at time of application, and was flood irrigated approximately 4 hours after application to a depth of 3 inches. Alfalfa had already sustained damage from alfalfa caterpillar feeding, with 4-5 nodes in the upper half of many plants completely defoliated. This loss of foliage may affect treatment efficacy for certain treatments, such as Steward®, that have some translaminar movement into soft tissues.

Alfalfa was sampled at one, four and seven days post treatment. Sampling consisted of ten five-foot sweeps per plot with a 15 inch diameter sweep net. Sweep net contents were transferred to plastic snap top containers, and then frozen. Samples were then processed, and insect specimens were separated and speciated, counted and recorded. Data were analyzed utilizing Statgraphics Plus for Windows (Manugistics, Inc.), and separations of treatment means for the various insects were obtained using a Fisher's least significant difference.

## Results

Alfalfa caterpillars

Populations of alfalfa caterpillars (*Colias eurytheme*) decreased rapidly during this experiment. The insecticides Baythroid® XL and Steward® resulted in significantly fewer alfalfa caterpillars when compared with the untreated check and other treatments at one day post treatment (Table 1). Little, if any, activity were noted at one day post treatment from other treatments based on numbers of alfalfa caterpillars collected in sweep net samples. Fewest numbers of alfalfa caterpillars were collected from Steward® treated alfalfa on this sample date and throughout the experiment.

No alfalfa caterpillars were collected from Steward® treated alfalfa at four days post treatment, indicating that reduced foliage availability at time of application did not negatively affect field efficacy of this product. Numbers of alfalfa caterpillars were very similar among all other treatments and the untreated check on this sample date. Although no statistical differences existed between treatments at seven days post treatment, fewer alfalfa caterpillars were collected from Steward®, Baythroid® XL and Prism® treated alfalfa than from Trilogy® treated or untreated alfalfa.

Beet Armyworms

Highest numbers of beet armyworm (*Spodoptera exigua*) larvae were generally noted at four days post treatment in this experiment (Table 1). All treatments resulted in a numerical reduction (about 33%) compared with the untreated check at one day post treatment, with the exception of the Steward® treatment which significantly reduced beet armyworm populations by about 83%. Application of Steward® resulted in 100% reduction at four days post treatment, although all other treatments were very similar to the untreated check on this sample date. Steward® treated alfalfa continued to have the fewest beet armyworms at seven days post treatment. These data indicate that applications of Steward insecticide were very effective even when the upper portions of the plants had already been defoliated.

Highest numbers of beet armyworms (32.75/5 sweeps) were noted from plots treated with Baythroid® XL at 4 days post treatment, although at seven days post treatment highest populations were noted from alfalfa treated with the selective grass herbicide Prism® (29.0/5sweeps). Similar population numbers were noted from alfalfa treated with Baythroid® XL (24.25/5 sweeps) on this sample date. Numbers of beet armyworms in Trilogy® and untreated alfalfa were almost identical at both four and seven days post treatment.

*Empoasca* spp. leafhoppers

Numbers of *Empoasca* spp. leafhoppers increased during this experiment. At one day after application Steward® and Baythroid® XL treatments resulted in significantly fewer collected adults of this insect when compared with other treatments, although nymphal populations were very low and similar among all treatments (Table 2).

Application of Baythroid® XL resulted in the fewest numbers of *Empoasca* spp. leafhoppers at both four and seven days post treatment, with 100% control of nymphs noted at four days post treatment. Steward® and Baythroid® XL treatments continued to have the fewest numbers of adult *Empoasca* leafhoppers at four days post treatment, but Prism® treated alfalfa had numericaly slightly fewer nymphs than Steward®.

Prism® treated alfalfa resulted in similar numbers of *Empoasca* leafhoppers to that of Steward® treated alfalfa. Numbers of this insect were numerically less than the untreated check at both four and seven days post treatment, indicating that Prism® herbicide has some activity against this insect. Although beneficial insect activity may be partially involved in reducing numbers of leafhoppers, this would also be expected in untreated plots as well. No reduction of *Empoasca* leafhoppers was noted from Trilogy®, although slightly higher total numbers of this insect were noted from this treatment than the untreated check on all three sample dates.

Palestriped flea beetles

Palestriped flea beetles *(Systena blanda)* were very abundant during this study (Table 3). Baythroid® XL was the only product in this experiment which exhibited effectiveness against this insect, with outstanding control (99%) at one day post treatment. All other treatments, including Prism® provided about 25% reduction at this point in the study. At four days post treatment activity was still evident from Baythroid® XL which provided 75% control, although no reduction was noted from any other treatment when compared with the untreated check. The untreated check had the fewest palestriped flea beetles at seven days after application, with highest numbers of this insect noted from Steward® treated alfalfa, although populations of this insect recorded from treated or untreated alfalfa was quite high at seven days post treatment.

Previous research with cyfluthin (active ingredient in Baythroid® XL) under fall alfalfa production conditions in the desert southwest had noted either excellent control of pale striped flea beetles for up to 10 days post treatment for an October application (Rethwisch et al., 2005) or control for only 4 days in a September applied experiment (Rethwisch et al. 2004). Both of these latter experiments had much lower levels of palestriped flea beetles and utilized much larger experimental plots than employed in this experiment however.

Threecornered alfalfa hoppers

Populations of threecornered alfalfa hoppers (*Spissistilus festinus*) were high during this study. Small plots were used for experimental treatments as plots were designed for alfalfa caterpillars, therefore clarity of treatment effects on control of highly mobile insects such as threecornered alfalfa hoppers was sacrificed. Baythroid® XL provided the best control with about 66% reduction at one day post treatment, with only about 25% reduction at four and seven days post treatment (Table 3) with reduced control thought due to movement of insects into the plots. When large plots have previously been utilized, control for this same rate of Baythroid® XL has approached 100% control for almost two weeks under higher populations of this insect (Rethwisch 2006). Steward® also provided some initial reduction of threecornered alfalfa hoppers under these conditions, but this was not noted after the first sample date. Usage of Trilogy® resulted in a slight reduction in numbers of threecornered alfalfa hoppers when compared with the untreated check throughout the experiment. Usage of Prism® did not result in reduction of threecornered alfalfa hoppers.

Lygus bugs

*Adults*

No statistical differences were noted during this experiment for numbers of adults lygus bugs (Table 4), which consisted primarily of western lygus bugs (*L. hesperus*). Fewest adults were collected from alfalfa treated with Steward® (29.5% fewer than untreated) at one day after application, followed by the Prism® treatment (18.1% fewer than untreated check). Alfalfa treated with Baythroid® XL had numerically more adult lygus (32.25/10 sweeps) than untreated alfalfa (26.25/10 sweeps) at one day post treatment. Adult lygus bugs were very similar at four days post treatment, although at seven days post treatment all treated alfalfa had 22-37.6% fewer adult lygus bugs than the untreated check with fewest (25.75/10 sweeps) noted from Prism® treated alfalfa.

*Large nymphs*

Application of Steward® resulted in significantly fewer large lygus bug nymphs on all three sample dates (Table 4). Prism® also significantly reduced large lygus bug nymphs (2.75/10 sweeps) compared with the untreated check (7.25/ 10 sweeps) at one day post treatment. The Baythroid® XL treatment had numerically higher numbers of large lygus bugs nymphs than the untreated check throughout the study, perhaps as a result of fewer beneficial insects than the untreated check at four and seven days post treatment. Large lygus bugs means were similar for all treated and untreated alfalfa at four (9.75-12.5/10 sweeps) and seven (19.5-23.25/10 sweeps) days post treatment with the exception of Steward® (0.5 and 5.0/10 sweeps respectively).

*Small nymphs*

Numerically fewer small lygus bugs were noted from Steward® treated alfalfa throughout this experiment with approximately 80% fewer small lygus bug nymphs than the untreated check at both one and four days post treatment, (Table 5). Statistical differences due to any treatment did not exist for this insect stage. Prism® treatments resulted in slightly fewer small lygus bugs than either Baythoid® XL treated or untreated alfalfa on all three sample dates.

*Total lygus bugs*

Steward® treated alfalfa had statistically fewer total lygus bugs (approximately 50%) than the untreated check at one day post treatment (Table 5), and had fewest total lygus bugs throughout the experiment. Application of Steward® resulted in statistically fewer total lygus bugs than only Prism® at four days post treatment. Numbers of lygus bugs recorded from Prism® treated alfalfa at seven days after application were numerically less than both Trilogy® and Baythroid® XL, as both latter treatments resulted in similar numbers of lygus bugs as untreated alfalfa at four and seven days post treatment.

Clover and other leafhoppers

Numbers of clover leafhoppers (*Aceratagilla sanguinolenta*) were fairly low during this experiment with highest populations noted at 10 days post treatment (Table 6). No statistical differences were noted at one or four days post treatment. Baythroid® XL was the only treatment that had numerically fewer clover leafhopper than the untreated check on both sample dates. At seven days post treatment both Baythroid® XL and Prism® treatments had significantly fewer clover leafhoppers than alfalfa treated with Trilogy®. Usage of Prism® resulted in a decline in clover leafhoppers populations as the study progressed. The reason for this observation is unclear, and additional experimentation is recommended to verify this observation.

*Acinopterus* sp. leafhoppers (thought to be *inornatus = aridellis*, characterized by black area on underside of thorax) were also noted in this study, and are mentioned due to populations again being present in area alfalfa. Prior to this experiment, adult *Acinopterus* leafhoppers were numerous enough in a fall 2005 experiment for insecticide efficacy data to be collected (Rethwisch et al, unpublished), but the authors had not previously encountered these leafhoppers prior to 2005 in such levels in low desert alfalfa. Future monitoring of this insect may be necessary, especially if this species is demonstrated to be a disease vector.

***Effects on Beneficial Insects***

Minute pirate bugs

Populations of minute pirate bugs (*Orius tristicolor*) were not prevalent during the experiment, thought due to high temperatures and predation from other beneficial insects. No trends or affects from treatments were noted from this experiment due to the low numbers (Table 6).

Western bigeyed bugs

Populations of western bigeyed bugs (*Geocoris pallens* Stål) were not greatly affected by treatments with the exception of Steward®, which significantly reduced numbers of adult and total western bigeyed bugs (approximately 63%) at one day post treatment compared to all other treatments and the untreated check (Table 7). Significant statistical differences were not measured at four or seven days post treatment in this experiment, although lowest numbers of western bigeyed bugs were noted from alfalfa treated with Steward® throughout the experiment. Data indicate that other treatments resulted in little reduction of numbers of western big-eyed bugs.

Damsel bugs

Damsel bugs populations were significantly lower (100% reduction) in plots treated with Baythroid® XL and Prism® than untreated alfalfa at one day post treatment (Table 8). The authors are unaware of any previous documentation related to insecticidal activity of either herbicide Prism® or the methylated seed oil Hasten® used with Prism® in this experiment. All treatments had numerically fewer damsel bugs than the untreated check at one and four days post treatment. No statistical differences were noted at four or seven days post treatment. Damsel bug numbers decreased throughout the experiment in alfalfa treated with Steward®, perhaps in response to alfalfa caterpillars and beet armyworms being effectively controlled with this product and leaving few prey for this predatory insect.

*Hyposoter exigua* wasps

Although no statistical differences existed between any treatment and the untreated check for numbers of *Hyposoter exiguae* wasps in this experiment, usage of Steward® and Baythroid® XL resulted in fewest numbers of this insect at one day post treatment (Table 8). Numbers of wasps collected from Trilogy® treated alfalfa were higher or very similar to those noted from untreated alfalfa throughout the experiment. Fewest wasps were noted in Baythroid® XL treated alfalfa at four days post treatment, and from Steward® treated alfalfa at seven days post treatment.

## Literature Cited

Rethwisch, M. 2006. Threecornered alfalfa hoppers. Pp. 2-3. In University of California Cooperative Extension Imperial County Agricultural Briefs, October, 2006. 16 pp.

Rethwisch. M.D., M. Williams, M. Luna, M. Reay and J. Van Dyke. 2005. Comparison of Baythroid® 2 and Renounce® 20WP for fall alfalfa insect control. Pp. 13-24. In University of Arizona College of Agriculture and Life Sciences 2005 Forage and Grain Report, Series P-143. M. Ottman, ed. 66 pp.

Rethwisch, M.D., M. Reay, L. Berger, E. Hawpe, J. Grudovich, R. Perez and D. Ramos. 2004. Comparisons of insecticides on fall alfalfa insect populations, and resultant hay yields and quality. Pp. 1-17. In University of Arizona College of Agriculture and Life Sciences 2004 Forage and Grain Report, Series P-140. M. Ottman, ed. 72 pp.

## Acknowledgements

The authors thank BayerCropScience for their financial support and for their product provision. We also thank Certis USA, DuPont, Valent USA, and Wilbur Ellis Company for providing products for this experiment.

**Table 1. Mean number of alfalfa butterfly and beet armyworm caterpillars per 10 five foot long sweeps following July 30, 2006 application.**

| | | Alfalfa Butterfly | | | Beet Armyworms | | |
|---|---|---|---|---|---|---|---|
| Treatment | Rate/acre | 1 day | 4 days | 7 days | 1 day | 4 days | 7 days |
| Baythroid® XL | 1.4 oz | 6.0a | 8.5 b | 1.75a | 14.25ab | 32.75 b | 24.25 b |
| Prism® | 14 oz | 31.75b | 9.0 b | 2.75a | 15.25ab | 24.5 b | 29.0 b |
| Steward® | 6.7 oz | 0.75a | 0.0a | 1.25a | 4.5a | 0.0a | 2.5a |
| Trilogy® | 32 oz | 29.0 b | 8.0 b | 6.5a | 16.0ab | 27.0 b | 15.5ab |
| Untreated Check | ----- | 30.5 b | 6.75ab | 8.25a | 24.0 b | 29.0 b | 15.25ab |

*Means in columns followed by the same letter are not statistically different at the p≤0.05 level (Fisher's LSD test).*

**Table 2. Mean number of *Empoasca* spp. leafhoppers per 10 five foot sweeps following July 30, 2006 application.**

| | | Adults | | | Nymphs | | | Total *Empoasca* | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Treatment | Rate/acre | 1 day | 4 days | 7 days | 1 day | 4 days | 7 days | 1 day | 4 days | 7 days |
| Baythroid® XL | 1.4 oz | 0.5a | 0.25a | 1.25a | 0.75a | 0.0a | 0.75a | 1.25ab | 0.25a | 2.0a |
| Prism® | 14 oz | 6.25 b | 3.25a | 8.0a | 1.25a | 2.75ab | 4.0ab | 7.5 b | 6.0a | 12.0ab |
| Steward® | 6.7 oz | 0.5a | 1.5a | 8.25a | 0.25a | 4.0ab | 2.5ab | 0.75a | 5.5a | 10.75ab |
| Trilogy® | 32 oz | 5.5 b | 8.5a | 13.0a | 0.75a | 5.75ab | 15.5b | 6.25ab | 14.25a | 28.5 b |
| Untreated Check | ------- | 4.25ab | 7.75a | 9.75a | 1.0 a | 8.25 b | 6.5ab | 5.25ab | 16.0a | 16.25ab |

*Means in columns followed by the same letter are not statistically different at the p≤0.05 level (Fisher's LSD test).*

**Table 3. Mean number of palestriped flea beetle adults and threecornered alfalfa hoppers per 10 five foot sweeps following July 30, 2006 application.**

| | | Palestriped flea beetles | | | Threecornered alfalfa hoppers | | |
|---|---|---|---|---|---|---|---|
| Treatment | Rate/acre | 1 day | 4 days | 7 days | 1 day | 4 days | 7 days |
| Baythroid® XL | 1.4 oz | 0.75a | 11.5a | 105.0a | 41.5a | 88.0a | 75.75a |
| Prism ® | 14 oz | 63.75b | 44.7 b | 118.25a | 125.5 b | 115.25b | 103.0 c |
| Steward® | 6.7 oz | 58.0 b | 52.5 b | 124.75a | 91.75b | 107.6ab | 94.5 bc |
| Trilogy® | 32 oz | 60.0b | 52.7 b | 111.5a | 104.0 b | 97.8ab | 85.5ab |
| Untreated Check | ----- | 80.25b | 46.0 b | 103.5a | 127.0 b | 106.7ab | 99.5 bc |

*Means in columns followed by the same letter are not statistically different at the p≤0.05 level (Fisher's LSD test).*

**Table 4. Mean number of lygus bug adults and large nymphs per 10 five foot sweeps following July 30, 2006 application.**

| | | Adults | | | Large nymphs | | |
|---|---|---|---|---|---|---|---|
| Treatment | Rate/acre | 1 day | 4 days | 7 days | 1 day | 4 days | 7 days |
| Baythroid® XL | 1.4 oz | 32.25a | 17.5a | 30.5a | 7.75 c | 10.75 b | 23.25b |
| Prism® | 14 oz | 21.5a | 17.75a | 25.75a | 2.75ab | 12.5 b | 20.5 b |
| Steward® | 6.7 oz | 18.5a | 15.0a | 30.5a | 0.75a | 0.5a | 5.0a |
| Trilogy® | 32 oz | 24.0a | 13.75a | 31.75a | 5.5 bc | 10.5 b | 19.5 b |
| Untreated Check | ----- | 26.25a | 16.25a | 41.25a | 7.25 c | 9.75ab | 20.75b |

*Means in columns followed by the same letter are not statistically different at the p≤0.05 level (Fisher's LSD test).*

**Table 5. Mean number of small lygus bugs and total lygus bugs per 10 five foot sweeps following July 30, 2006 application.**

| | | Small nymphs | | | Total Lygus Bugs | | |
|---|---|---|---|---|---|---|---|
| Treatment | Rate/acre | 1 day | 4 days | 7 days | 1 day | 4 days | 7 days |
| Baythroid® XL | 1.4 oz | 6.0a | 7.0a | 20.0a | 46.0 b | 35.25ab | 73.75a |
| Prism® | 14 oz | 5.25a | 6.75a | 12.0a | 29.5ab | 37.0 b | 58.25a |
| Steward® | 6.7 oz | 1.5a | 1.25a | 11.75a | 20.75a | 16.75a | 47.25a |
| Trilogy® | 32 oz | 4.75a | 8.0a | 23.25a | 34.25ab | 32.25ab | 74.5 a |
| Untreated Check | ----- | 7.25a | 8.75a | 16.25a | 40.75 b | 34.75ab | 78.25a |

*Means in columns followed by the same letter are not statistically different at the p≤0.05 level (Fisher's LSD test).*

**Table 6. Mean number of clover leafhoppers/10 five foot sweeps following July 30, 2006 application.**

| | | Clover Leafhoppers | | | Minute pirate bugs | | |
|---|---|---|---|---|---|---|---|
| Treatment | Rate/acre | 1 day | 4 days | 7 days | 1 day | 4 days | 7 days |
| Baythroid® XL | 1.4 oz | 2.75a | 2.25a | 3.25a | 0.0a | 0.25a | 0.0a |
| Prism® | 14 oz | 5.25a | 3.0a | 2.75a | 1.0a | 0.0a | 0.0a |
| Steward® | 6.7 oz | 2.0a | 4.75a | 5.25ab | 0.0a | 0.25a | 0.25a |
| Trilogy® | 32 oz | 4.5a | 2.5a | 7.25 b | 0.5a | 0.5a | 0.0a |
| Untreated Check | ----- | 3.5a | 3.5a | 4.25ab | 0.5a | 0.0a | 0.5a |

*Means in columns followed by the same letter are not statistically different at the p≤0.05 level (Fisher's LSD test).*

**Table 7. Mean number of bigeyed bugs *(Geocoris*) per 10 five foot long sweeps following July 30, 2006 application.**

| | | Adults | | | Nymphs | | | Total *Geocoris* | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Treatment | Rate/acre | 1 day | 4 days | 7 days | 1 day | 4 days | 7 days | 1 day | 4 days | 7 days |
| Baythroid® XL | 1.4 oz | 7.0 b | 3.75a | 3.75ab | 1.0a | 0.25a | 0.5a | 8.0 b | 4.0a | 4.25a |
| Prism® | 14 oz | 7.25 b | 4.5a | 7.25 b | 0.5a | 0.25a | 0.5a | 7.75 b | 4.75a | 7.75a |
| Steward® | 6.7 oz | 3.25a | 2.25a | 2.25a | 0.25a | 0.25a | 1.5a | 3.5a | 2.5a | 3.75a |
| Trilogy® | 32 oz | 7.5 b | 2.25a | 5.0 ab | 2.25a | 0.75a | 0.75a | 9.75b | 3.0a | 5.75a |
| Untreated Check | ----- | 8.0 b | 4.25a | 5.75ab | 1.5 a | 1.5a | 0.75a | 9.5 b | 5.75a | 6.5a |

*Means in columns followed by the same letter are not statistically different at the p≤0.05 level (Fisher's LSD test).*

**Table 8. Mean number of damsel bugs and *Hyposoter* wasps per 10 five foot sweeps following July 30, 2006 application.**

| | | **Damsel Bugs** | | | **Hyposoter wasps** | | |
|---|---|---|---|---|---|---|---|
| Treatment | Rate/acre | 1 day | 4 days | 7 days | 1 day | 4 days | 7 days |
| Baythroid® XL | 1.4 oz | 0.0a | 0.25a | 2.50a | 1.0a | 1.0a | 4.25a |
| Prism® | 14 oz | 0.0a | 0.5a | 1.25a | 2.0a | 1.25a | 2.75a |
| Steward® | 6.7 oz | 1.75ab | 0.75a | 0.50a | 0.75a | 1.75a | 2.50a |
| Trilogy® | 32 oz | 1.25ab | 0.50a | 2.00a | 3.25a | 3.25a | 4.00a |
| Untreated Check | ----- | 2.25 b | 1.25a | 1.75a | 2.75a | 1.75a | 4.25a |

*Means in columns followed by the same letter are not statistically different at the p≤0.05 level (Fisher's LSD test).*