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EFFICACY OF MUSTANG MAX (F0570) FOR INSECT PEST CONTROL IN COTTON

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Abstract

Zeta-Cypermethrin has been extensively evaluated in field efficacy trials during the past years for control of the major insect pests of cotton. Mustang Max, a new zeta-cypermethrin formulation with an optimized content of the most active isomer, was evaluated in 2001-03 to determine efficacy. Mustang Max was also compared to standard insecticides currently being used in cotton. In field efficacy trials, Mustang Max applied at 0.018 lb ai/A provided commercially acceptable control of Helicoverpa zea (Boddie) equal to Karate and Decis at 0.025 and 0.025 lb ai/A respectively and better than Baythroid, Leverage, Denim, Steward, Tracer and Asana XL at rates of 0.028, 0.068, 0.01, 0.11, 0.063 and 0.04 lb ai/A, respectively. Mustang Max at 0.018 lb ai/A also provided acceptable control of Lygus spp. equal to Karate and Bidrin at 0.028 and 0.5 lb ai/A respecitively and better than Baythroid, Centric, Orthene, Leverage, Actara and Assail at rates of 0.03, 0.047, 0.75, 0.063, 0.063 and 0.05 lb ai/A respectively at seven days after treatment. All of the pyrethroid treatments resulted in better residual control of Lygus spp. than the other chemistries from a seasonal average standpoint. Nezara spp. control with Mustang Max at 0.018 lb ai/A was equal to Karate, Assana XL, Centric and Bidrin at 0.025, 0.04, 0.047 and 0.5 lb ai/A respectively and better than Orthene or Vydate 0.75 and 0.33 lb ai/A respectively at seven days after treatment. Euschistus control with Mustang Max at 0.022 lb ai/A was numerically lower than Karate and Bidrin at 0.025 and 0.5 lb ai/A respectively, equal to Leverage at 0.063 lb ai/A and better than Baythroid, Centric and Vydate at 0.028, 0.047 and 0.33 respectively at seven days after treatment. Aphis gossypii, Glover, control with Mustang Max at 0.018 lb ai/A was somewhat less than Provado, Actara, Centric, Assail or Leverage at 0.047, 0.063, 0.05, 0.05 and 0.08 lb ai/A respectively and better than Baythroid at 0.028 lb ai/A.

Introduction

Zeta-cypermethrin is a pyrethroid insecticide that has been used successfully throughout the cotton belt for many years to control a variety of pest both alone and in tank mix combinations. Mustang Max (FMC Corporation) is a new zeta-cypermethrin formulation, which consists of a higher concentration of the most active isomer at a Cis/trans ratio of 55/45%. Mustang Max is a broad-spectrum cotton insecticide, which exhibits the ability to control numerous cotton pests at lower use rates, and has demonstrated longer residual activity than traditional zeta-cypermethrin.

For the past several years, Mustang Max (F0570) has been evaluated in university/extension efficacy studies under a broad range of environmental conditions and cotton insect pests infestation levels across the cotton belt. Reported herein, are summary results of these studies with regard to the efficacy of Mustang Max for control of the Cotton Bollworm (Helicoverpa zea Boddie), Plant Bug (Lygus spp.), cotton aphid (Aphis gossypii Glover), Green Stink Bug (Nezara viridula) and the Brown Stink Bug (Euschistus servus)

Materials and Methods

Field efficacy results presented herein were obtained from small plot trials conducted by university/extension, contract research and FMC personnel across the cotton belt utilizing similar test procedures. Test plot size generally ranged from 6 to 8 rows wide by 40 to 100 feet in length, replicated 4 times in a randomized complete block design. Applications were typically made with compressed air or CO2 charged small plot sprayers using water as the carrier. Total spray volume ranged from 5 to 18 gallons/acre. Cotton varieties, planting dates and production practices were typical of each geographic area.

Mustang Max 0.8 EC was evaluated against various standard cotton insecticides such as Karate Z, Baythroid 2 E, Provado1.6 F, Bidrin 8 E, Actara 25 WG, Leverage 2.7 EC, Centric 40 WG, Steward 1.25 SC, Assail 20 WP, Decis 1.5 EC, Tracer 4 SC, Vydate 3.77 L and Denim 0.16 EC plus an untreated check. Trials were initiated and subsequent treatments made in accordance with insect pest control recommendations for the region.

Insect infestation levels were determined by standard evaluation procedures that varied by species. Cotton Bollworm infestations were determined by examination of a set number of cotton plants and/or bolls per plot prior to and following subsequent applications. Data were then compiled and analyzed based on a seasonal mean percent live larvae/plant, boll damage and percent control over multiple applications and evaluations. Mustang Max was analyzed against the specific competitive compounds only in those replicated trials where all treatments occurred. By analyzing the data in this manner, variability due to pest infestation levels, application methods and environmental conditions could be eliminated.

Plant Bug, Green Stink Bug and Brown Stink Bug infestations were determined using the standard sweep net technique. Numbers of plant bug/stink bug adults and nymphs were obtained from a sample size of no less than 25 sweeps per plot taken 3 days post-treatment. Plant bug data were summarized using a combined total of both adult and nymph stages. Stinkbug data were compiled and analyzed based on a seasonal mean percent control.

Cotton aphid populations were assessed by counting the number of pests per square inches of leaf surface or total pests per leaf taken from a designated location on the plant. In both cases, seasonal mean percent control values were generated based on the untreated check.

Results and Discussion

Results of the efficacy of Mustang Max for control of the Cotton Bollworm against the standard products are shown in Tables 1, 2 and 3. Mustang Max at 0.018 lb ai/A resulted in seasonal mean number of percent damaged bolls less than that of Karate, Tracer, Denim, Steward, Baythroid and Leverage at rates of 0.025, 0.067, 0.01, 0.11, 0.028 and 0.063 lb ai/A, respectively, based on 16 replicated head-to-head trials (Table 1). All treatments were significantly better than the untreated check. Mustang Max at 0.018 lb ai/A was numerically less than Steward at 0.11 lb ai/A and numerically higher than Denim, Leverage, Tracer, Karate and Baythroid at 0.01, 0.063, 0.067, 0.025 and 0.028 lb ai/A respectively in terms of percent square damage based on 10 replicated head-to-head trials (Table 2). All treatments were significantly better than the untreated check. Mustang Max at 0.018 lb ai/A resulted in numerically higher seasonal mean percent control than Karate, Baythroid, Leverage, Denim, Steward, Tracer and Decis at 0.025, 0.028, 0.068, 0.01, 0.11, 0.063 and 0.025 lb ai/A respectively, based on 12 replicated head-to-head trials (Table 3).

Mustang Max at 0.018 lb ai/A resulted in numerically higher seasonal mean percent control of Plant Bug than that of Orthene, Baythroid, Centric, Assail, Actara, Leverage and Bidrin at 0.75, 0.03, 0.047, 0.05, 0.063, 0.063 and 0.5 lb ai/A respectively, and equal to Karate at 0.028 lb ai/A in 12 replicated head-to-head trials (Table 4). All treatments were significantly better than the untreated check.

Mustang Max at 0.018 lb ai/A resulted in numerically lower seasonal mean percent control of *Nezara* spp. than Vydate and Centric at 0.33 and 0.047 lb ai/A respectively and numerically higher control than Asana XL, Bidrin and Orthene at 0.04, 0.5 and 0.75 lb ai/A respectively. Mustang Max at 0.018 lb ai/A was equal in control to Karate at 0.025 lb ai/A., based on 11 replicated head-to-head trials (Table 5). All treatments resulted in numerically better control than the check. The data for these same treatments at seven days after application are presented in Table 6.

Mustang Max at 0.022 lb ai/A resulted in numerically less seasonal mean control of *Euschistus* spp. than Karate, Centric and Vydate at 0.025, 0.047 and 0.33 lb ai/A respectively and numerically higher control than Baythroid, Bidrin and Leverage at 0.028, 0.5 and 0.063 lb ai/A respectively (Table 7) based on 9 replicated head-to-head trials. The data for these same treatments at seven days after application are presented in Table 8.

Mustang Max at 0.018 lb ai/A resulted in numerically less seasonal mean percent control of Cotton Aphid than Provado, Leverage, Centric, Assail and Orthene at 0.047, 0.08, 0.05, 0.05 and 0.5 lb ai/A respectively and numerically higher seasonal mean percent control than Baythroid and Actara at 0.028 and 0.063 lb ai/A based on 6 replicated head-to-head trials (Table 9). All treatments resulted in numerically higher control than the check.

Table 1. Efficacy of Mustang Max 0.8 EC on Bollworm in Cotton.

	Seasonal Mean Percent	
Treatment	Rate (lb ai/A)	% Damaged Bolls
Mustang Max	0.018	1.8
Karate	0.025	2.4
Tracer	0.067	7.5
Denim	0.01	2.5
Steward	0.11	7.8
Baythroid	0.028	2.4
Leverage	0.063	2.5
Check*		8.5

*Based on 16 replicated head-to-head trials.

Table 2. Efficacy of Mustang Max 0.8 EC on Bollworm in Cotton.

	Seasonal Mean Percent	
Treatment	Rate (lb ai/A)	% Damaged Squares
Mustang Max	0.018	3.9
Denim	0.010	4.4
Leverage	0.063	5.0
Karate	0.025	6.3
Baythroid	0.028	5.7
Steward	0.11	3.0
Tracer	0.067	5.6
Check*		13.7

*Based on 10 head-to-head trials.

Table 3. Efficacy of Mustang Max 0.8 EC on Bollworm in Cotton.

	Seasonal Mean Percent	
Treatment	Rate (lb ai/A)	% Control
Mustang Max	0.018	89.6
Karate	0.025	80.5
Baythroid	0.028	72.8
Leverage	0.068	46.2
Denim	0.01	63.4
Steward	0.11	76.0
Decis	0.025	67.7
Tracer	0.063	74.2
Check*	N/A	0.0

*Based on 12 replicated head-to-head trials.

Table 4. Efficacy of Mustang Max 0.8 EC on Plant Bug in Cotton.

	Seasonal Mean Percent	
Treatment	**Rate (lb ai/A)**	**% Control**
Mustang Max	0.18	87.5
Karate	0.028	88.0
Baythroid	0.3	67.9
Leverage	0.063	59.2
Bidrin	0.5	55.8
Orthene	0.75	56.9
Centric	0.048	66.0
Actara	0.063	51.3
Assail	0.05	56.7
Check*	N/A	0.0

*Based on 12 replicated head-to-head field trials.

Table 5. Efficacy of Mustang Max 0.8 EC on *Nezara* spp. in Cotton.

	Seasonal Mean Percent	
Treatment	**Rate (lb ai/A)**	**% Control**
Mustang Max	0.018	86.3
Karate	0.025	86.3
Centric	0.047	93.7
Vydate	0.33	90.8
Bidrin	0.5	64.6
Orthene	0.75	56.2
Asana XL	0.04	77.9
Check*	N/A	0.0

*Based on 11 replicated head-to-head trials.

Table 6. Efficacy of Mustang Max 0.8 EC on *Nezara* spp. in Cotton.

	7 Days After Application	
Treatment	**Rate (lb ai/A)**	**% Control**
Mustang Max	0.018	100
Karate	0.025	100
Centric	0.047	100
Vydate	0.33	77.8
Bidrin	0.5	96.3
Orthene	0.75	66.6
Asana XL	0.04	100
Check*	N/A	0.0

*Based on 11 replicated head-to-head trials.

Table 7. Efficacy of Mustang Max 0.8 EC on *Euschistus*_spp, in Cotton.

	Seasonal Mean Percent	
Treatment	**Rate (lb ai/A)**	**% Control**
Mustang Max	0.018	63.7
Karate	0.025	71.5
Centric	0.047	66.0
Vydate	0.33	68.0
Bidrin	0.5	46.7
Baythroid	0.028	60.1
Leverage	0.063	42.5
*Check	N/A	0.0

*Based on 9 replicated head-to-head trials.

Table 8. Efficacy of Mustang Max 0.8 EC on *Euschistus*_spp, in Cotton.

	7 Days After Application	
Treatment	**Rate (lb ai/A)**	**% Control**
Mustang Max	0.018	87.5
Karate	0.025	100
Centric	0.047	72.1
Vydate	0.33	65.0
Bidrin	0.5	93.5
Baythroid	0.028	60.1
Leverage	0.063	85.1
*Check	N/A	0.0

*Based on 9 replicated head-to-head trials.

Table 9. Efficacy of Mustang Max 0.8 EC on Cotton Aphid in Cotton.

	Seasonal Mean Percent	
Treatment	**Rate (lb ai/A)**	**% Control**
Mustang Max	0.018	73.3
Baythroid	0.028	28.6
Provado	0.047	76.8
Actara	0.063	72.9
Leverage	0.068	83.3
Orthene	0.5	73.2
Assail	0.05	92.7
Centric	0.05	91.1
Check*	N/A	0.0

*Based on 6 replicated head-to-head trials.