AgriLIFE EXTENSION
Texas A&M System

Controlling Populations of Bollworm and Fall Armyworm in Non-Bt Cotton

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Summary:

Non-Bt cotton comprises approximately 50% of the cotton acreage planted in the Texas High Plains. Damage caused by bollworms, *Heliocoverpa zea,* and fall armyworms, *Spodoptera fugiperda,* often result in significant yield loss. Prior to August, populations are predominantly bollworms, but by mid-August populations are often mixed with both species. Pyrethroids used to control bollworms work well but are weak on controlling fall armyworms. Armyworm materials also tend to be weak on bollworms.

Over the past six years there has been an increase in fall armyworm numbers in the Texas High Plains. It is often difficult to differentiate between bollworms and fall armyworms when they are small; therefore, deciding on the appropriate insecticide to use comes into question

Objective:

The objective of this study was to evaluate the efficacy of new insecticidal chemistries on mixed populations of bollworms and fall armyworms in non-Bt cotton.

Materials and Methods:

Three tests were conducted in 2010-2011 in the Texas High Plains. All test locations were center pivot irrigated. The first test was conducted in 2010 in Loop, TX. The tests in 2011 were conducted in Brownfield, TX and Hobbs, NM, respectively. The 2010 Loop, TX test was planted on 7 May. The 2011 Brownfield, TX was planted on 15 May. Both were planted using 40-inch row spacing. The Hobbs, NM test was planted on 24 May using 36-inch row spacing. In all tests, plots were 4 rows wide x

50 ft long. Plots were arranged in a randomized complete block design with 4 replicates.

Treatment lists for Loop and Brownfield, TX can be found in Tables 1 and 2, and the treatment list for Hobbs, NM can be found in Table 3.

All treatments were applied with a CO_2 pressurized hand boom, which was calibrated to deliver 10 gallons/acre. The boom consisted of 2 hollow cone TX-6 nozzles per row, spaced at 20 inches. Worm populations were counted by making whole plant inspections on 10 plants per plot. Due to lower worm numbers in the Brownfield test, 20 plants per plot were counted.
All count data were analyzed using PROC MIXED. The means were separated using an F protected LSD ($P \leq 0.05$).

Results and Discussion:

Prior to application in 2010, August 17 pre-treatment counts of total larvae did not significantly differ between treatments. The worm population for this test was estimated to be ~70% bollworms (Figure 1).

At 7-DAT, all of the treatments had fewer medium and large bollworms than the untreated, with the exception of Belt at the lower rate (2.0 fl-oz/acre). There were no differences among the other treatments. Belt is thought to be more efficacious toward fall armyworms than bollworms. As expected, at its lowest labeled rate, Belt did not provide effective bollworm control (Figure 2).
Against fall armyworms, the only treatment that differed from the untreated was the tank mix of Mustang Max + Belt. Pyrethroids are generally considered weak against fall armyworms. Belt is known to have activity toward fall armyworms, but activity in cotton is uncertain. In this test Belt at the low rate (2.0 fl-oz/acre) failed to achieve adequate control (Figure 3).

In Brownfield, TX 2011, prior to application, July 27 pre-treatment counts of total larvae did not significantly differ between treatments. The worm population in this test was comprised of all bollworms. Due to the low infestation, 20 plants per plot were sampled. In 2010, at the low labeled rate (2.0 fl-oz/acre), Belt did not show adequate control of bollworms or fall armyworms. In 2011, Belt was added to the treatment list using the high labeled rate (3.0 fl-oz/acre). At 7-DAT, Blackhawk at the low and high rates and Belt at the high rate did not significantly differ from the untreated check. However, Benevia at the low, medium, and high rates, and the standard pyrethroid Ammo were significantly different from the untreated check. As mentioned above, Belt did not perform well at the low rate; however, the high rate of Belt did not perform as expected on controlling bollworms (Figure 4).

In Hobbs, NM 2011, prior to application, August 18 pre-treatment counts of total larvae showed no significant differences between treatments. The worm population at this test site was estimated to ~60% fall armyworms (Figure 5).

At 11-DAT, all treatments had fewer medium and large bollworms than the untreated check. Although Belt did significantly differ from the untreated check, it still did not provide adequate control of bollworms. However, Prevathon and Mustang Max demonstrated good control against bollworms (Figure 6).

Against fall armyworms, the only treatment to differ from the untreated check was Prevathon. As expected, pyrethroids tend to be weaker toward fall armyworms than bollworms. However, Belt at the high rate (3.0 fl-oz/acre) did not provide proper control of fall armyworms (Figure 7). Based on these data, Belt should be mixed with a pyrethroid when targeting mixed populations of bollworms and fall armyworms in cotton.

Acknowledgments:

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Disclaimer Clause:

Trade names of commercial products used in this report are included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where conditions vary.

Table 1. Insecticide treatments and rates. Loop, TX. 2010		
Treatment	Active ingredient	Rate (product/Ac)
1) Untreated	--	--
2) Mustang Max 0.83 EC	Zeta-cypermethrin	2.6 fl-oz
3) Mustang Max 0.83 EC	Zeta-cypermethrin	3.6 fl-oz
4) Karate 1 EC	Lambda-cyhalothrin	5.12 fl-oz
5) Holster 2.5 EC	Cypermethrin	5.0 fl-oz
6) Belt 4 SC	Flubendiamide	2.0 fl-oz
7) Mustang Max + Belt	Zeta-cypermethrin + Flubendiamide	2.6 fl-oz + 2.0 fl-oz
all treatments included Dyne-Amic at 0.25% v/v		

Table 2. Insecticide treatments and rates. Brownfield, TX. 2011		
Treatment	Active ingredient	Rate (product/Ac)
1) Untreated	--	--
2) Blackhawk 36 WG	Spinosad	2.5 oz
3) Blackhawk 36 WG	Spinosad	3.3 oz
4) Belt 4 SC	Flubendiamide	3.0 fl-oz
5) Benevia 10 OD	Cyantraniliprole	6.75 fl-oz
6) Benevia 10 OD	Cyantraniliprole	10.1 fl-oz
7) Benevia 10 OD	Cyantraniliprole	13.5 fl-oz
8) Ammo 2.5 EC	Cypermethrin	5.0 fl-oz
[a]*Blackhawk, Belt and Ammo included Dyne-Amic at 0.25% v/v, Benevia included Penetrator Plus at 2% v/v*		

Table 3. Insecticide treatments and rates. Hobbs, NM. 2011		
Treatment	Active ingredient	Rate (product/Ac)
1) Untreated	--	--
2) Belt 4 SC	Flubendiamide	3.0 fl-oz
3) Prevathon 0.43 SC	Chlorantranilipyrole	27.0 fl-oz
4) Mustang Max 0.83 EC	Zeta-cypermethrin	3.6 fl-oz
[a]*No adjuvants included*		

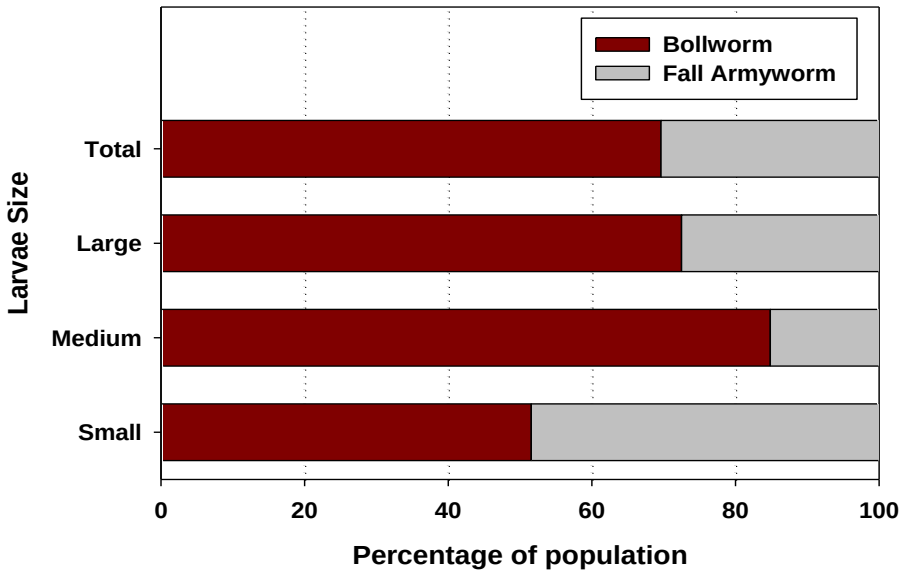

Figure 1. Percentage of population. Loop, TX 2010

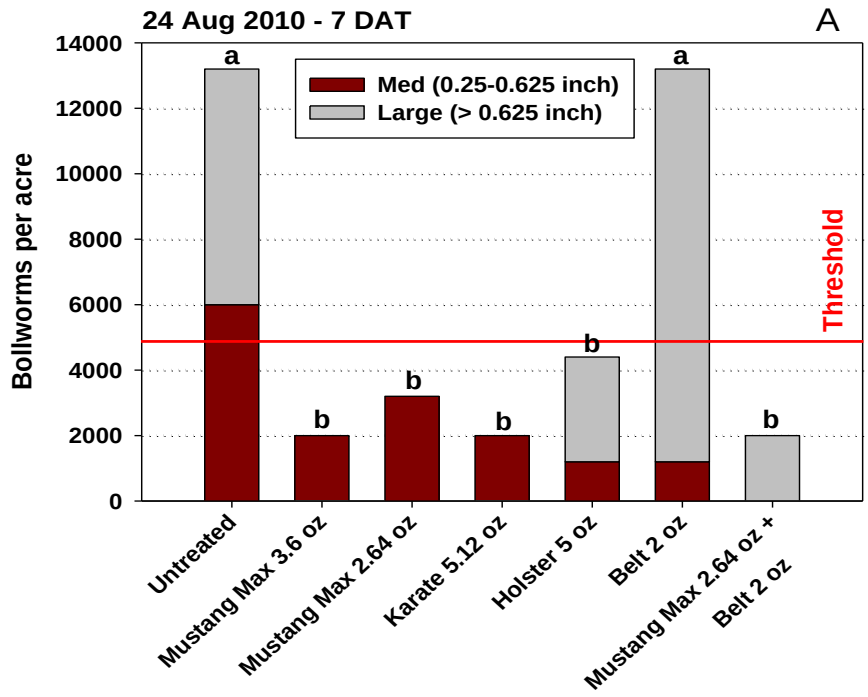

Figure 2. Number of bollworms per acre at 7-DAT. Loop, TX 2010. Bars capped the same letter are not significantly different.

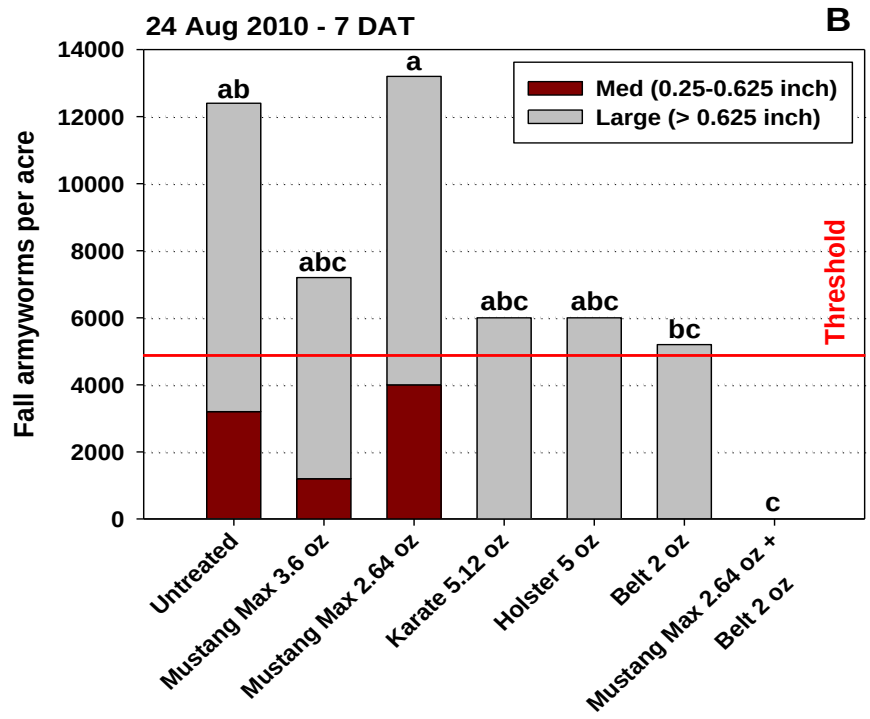

Figure 3. Number of fall armyworms at 7-DAT. Loop, TX 2010. Bars capped by the same letter are not significantly different

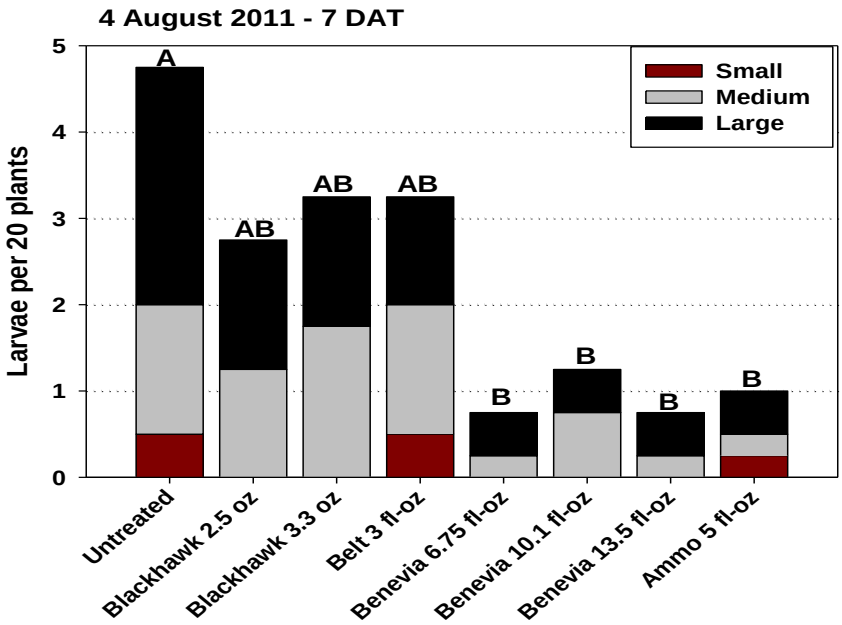

Figure 4. Number of larvae per 20 plants at 7-DAT. Brownfield, TX 2011. Bars capped by the same letter are not significantly different

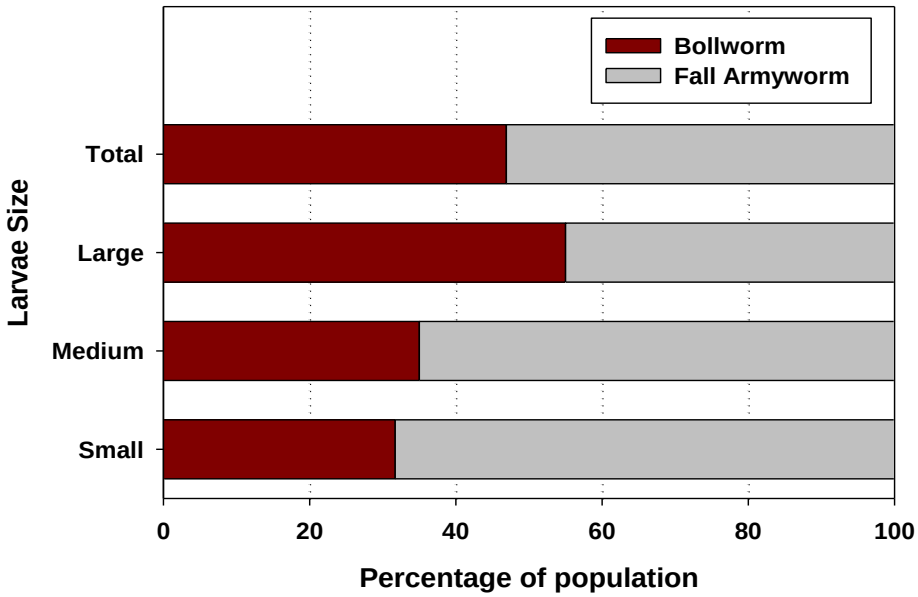

Figure 5. Percentage of population. Hobbs, NM 2011.

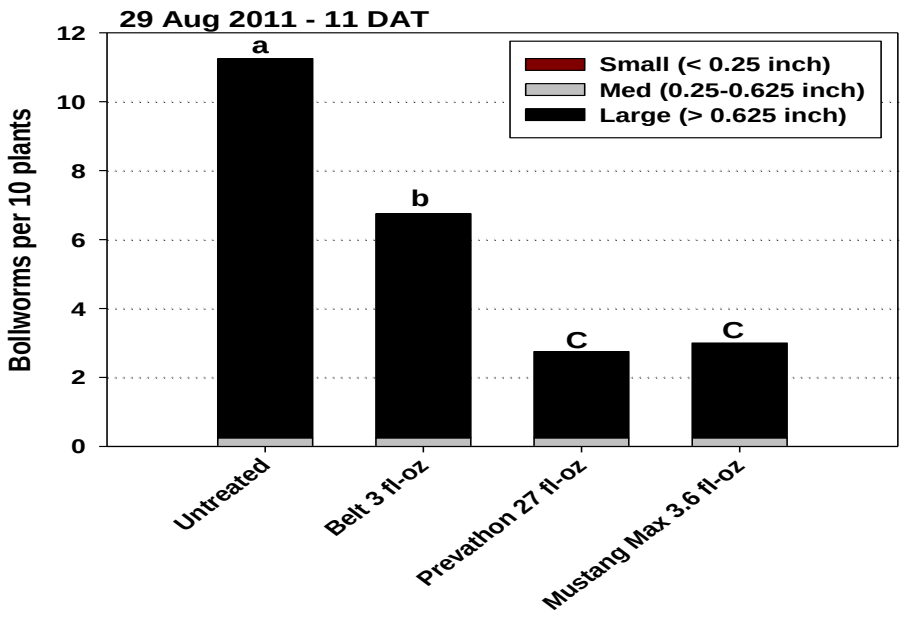

Figure 6. Number of bollworms per 10 plants at 7-DAT. Hobbs, NM 2011. Bars capped by the same letter are not significantly different.

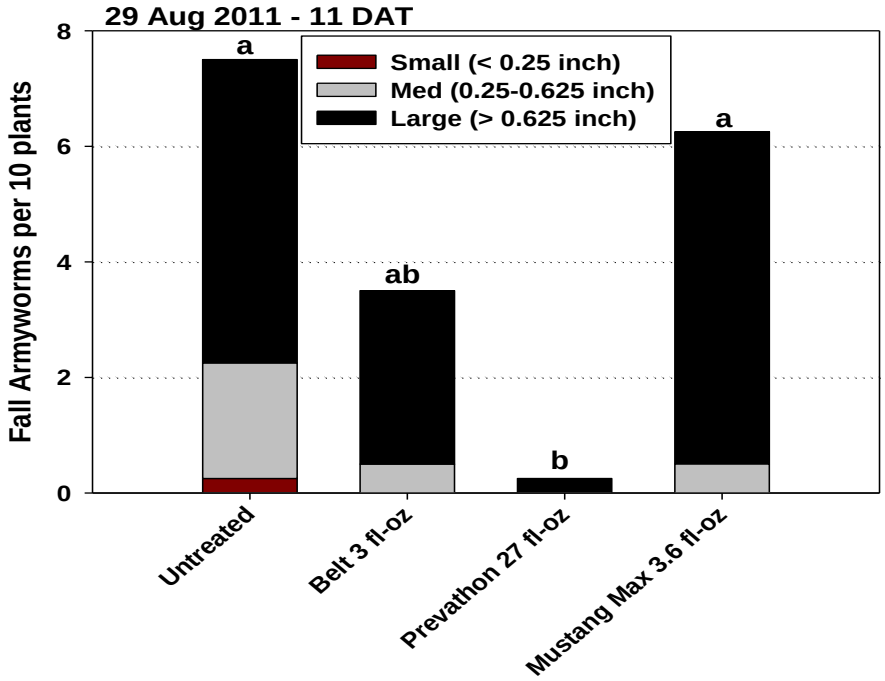

Figure 7. Number of fall armyworms per 10 plants at 7-DAT. Hobbs, NM 2011. Bars capped by the same letter are not significantly different.