RYNAXYPYR™: A NOVEL INSECTICIDE FOR CONTROL OF HELIOTHINES IN CONVENTIONAL AND BOLLGARD COTTON

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Abstract

In 2006, Rynaxypyr™ was evaluated in three studies in Jefferson County, Arkansas for control of heliothines. In the first trial, Ryanxypyr™ was applied at different rates to conventional non-bt cotton in comparison with Tracer (spinosad), Tracer and Capture (bifenthrin) tank mixed, and a Bollgard II variety. Significant differences were observed among treatments in regard to seasonal total damage and seasonal total larvae. In the second trial, Rynaxypyr™ was applied at different rates to Bollgard cotton in comparison with Asana XL (esfenvalerate), Capture and Orthene (acephate) tank mixed, Capture alone, and Tracer and Capture tank mixed. Significant differences were observed only between treatments and the untreated check. In the third trial, Rynaxypyr™ was applied at a single rate in comparison with Experimental 1, Larvin (thiodicarb), Tracer, Tracer and Capture tank mixed, Denim (emamectin benzoate), and Steward (indoxacarb). Significant differences were observed among treatments in regard to seasonal total damage, seasonal total larvae, and yield.

Introduction

Rynaxypyr 35 WG is a new foliar-applied insecticide being developed by DuPont™ to control lepidopteran pests in cotton, and to control pests in other major crops in the mid-south including rice, soybeans, and sugarcane, as well as in fruits, nuts, and vegetables. Rynaxypyr's mode of action is activation of insect ryanodine receptors, which stimulates the release of calcium from internal stores of smooth and striated muscle, causing impaired muscle regulation, paralysis, and finally death. Rynaxypyr appears to have appreciable selectivity for insect ryanodine receptors over mammalian receptors.

Materials and Methods

Three field experiments were conducted in 2006 in Jefferson County, Arkansas. All three trials had plot sizes of 8 rows (38 inch spacing) and 50 feet in length. A randomized complete block design with four replications was also used for each trial. Treatments were applied using a John Deere 6500 Hi-Cycle with an 8 row boom on 19-inch nozzle spacing. The nozzles used for application were Tee Jet TXVS-6. Operating pressure was 45 pounds per square inch and 9.69 gallons per acre of volume.

The first trial compared Rynaxypyr and traditional insecticides in conventional non-bt cotton to Bollgard II cotton. Delta Pine 434 was planted on May 16, 2006. Insecticide applications were made on 10 July and 2 August. Treatments included an untreated check, Ryanxypyr at 0.088 lb ai/a followed by (FB) Rynaxypyr at 0.066 lb ai/a, Rynaxypyr at 0.088 FB Rynaxypyr at 0.088 lb ai/a, Tracer at 0.067 lb ai/a, a Bollgard II variety which remained untreated, and Tracer at 0.033 lb ai/a tank mixed with Capture at 0.1 lb ai/a. Evaluations were made on 13 July (3 DAT), 19 July (9 DAT), 26 July (15 DAT), 31 July (20 DAT), 2 August (22 DAT), 7 August (5 DAT). Evaluations consisted of examining random samples of 25 terminals, squares, blooms, and bolls in each plot. Data were analyzed using Agricultural Research Manager Version 7 using Analysis of Variance and LSD (P=.10, Student-Newman-Keuls).

The second trial compared Rynaxypyr and traditional insecticides in Bollgard cotton. Delta Pine 444 was planted on May 16, 2006. Insecticide applications were made on 31 July. Treatments included an untreated check, Rynaxypyr at 0.022 lb ai/a, Rynaxypyr at 0.044 lb ai/a Asana XL at 0.03 lb ai/a, Capture at 0.046 lb ai/a tank mixed with Orthene at 0.5 lb ai/a, Capture alone at 0.046 lb ai/a, and Tracer at 0.033 lb ai/a tank mixed with Capture at 0.1 lb

ai/a. Evaluations were made on 3 August (3 DAT), and 7 August (7 DAT). Evaluations consisted of examining random samples of 25 terminals, squares, blooms, and bolls in each plot. Data were analyzed using Agricultural Research Manager Version 7 using Analysis of Variance and LSD (P=.10, Student-Newman-Keuls).

In the third trial Rynaxypyr was evaluated in comparison to traditional and experimental insecticides in conventional non-bt cotton. Delta Pine 434 was planted on May 16, 2006. Insecticide applications were made on 10 July, 20 July, and 31 July. Treatments included multiple rates of Experimental I, Experimental I tank mixed with Larvin at 0.12 lb ai/a, Larvin alone at 0.12 lb ai/a, Tracer at 0.078 lb ai/a, Tracer at 0.0624 lb ai/a tank mixed with Capture at 0.042 lb ai/a, Denim at 0.01 lb ai/a, Rynaxypyr at 0.088 lb ai/a, and Steward at 0.1 lb ai/a. Evaluations were made on 13 July (3 DAT), 17 July (7 DAT), 24 July (4 DAT), 31 July (11 DAT), 3 August (3 DAT), and 9 August (9 DAT). Evaluations consisted of examining random samples of 25 terminals, squares, blooms, and bolls in each plot. Data were analyzed using Agricultural Research Manager Version 7 using Analysis of Variance and LSD (P=.10, Student-Newman-Keuls).

Results and Discussion

In the first trial, in which Rynaxypyr and traditional insecticides in conventional non-bt cotton were compared to Bollgard II cotton, significant differences were observed among treatments for seasonal total damage. Both treatments of Rynaxypyr and Bollgard II displayed significantly less damage than the untreated check, Tracer, and Tracer tank mixed with Capture. For seasonal total larvae, both treatments of Rynaxypyr was significantly better than the untreated check, Tracer, and Tracer tank mixed with Capture. Rynaxypyr was numerically better than Bollgard II, but they did not statistically differ. Bollgard II was statistically better than the untreated check and Tracer tank mixed with Capture. For yield, no statistical differences were observed among treatments.

In the second trial, in which Rynaxypyr and traditional insecticides were compared on Bollgard cotton, all treatments were statistically better than the untreated check for seasonal total damage and seasonal total larvae found. For yield, Tracer tank mixed with Capture was the only treatment which performed statistically better than the untreated check, though it did not differ from any other treatments.

In the third trial, in which Rynaxypyr was compared to traditional and experimental insecticides on conventional non-bt cotton, all treatments performed statistically better than the untreated check for seasonal total damage. Rynaxypyr and Tracer alone showed significantly less damage than a single Experimental I treatment, Experimental I tank mixed with Larvin, Larvin alone, Tracer tank mixed with Capture, Denim, and Steward. Three treatments of Experimental I performed statistically better than the remaining treatment of Experimental I and Steward. For seasonal total larvae found, all treatments performed statistically better than the untreated check. Three treatments of Experimental I, Tracer alone, and Rynaxypyr were numerically the best treatments for seasonal total larvae, though they did not significantly differ from any other treatments. For yield, a single treatment of Experimental performed significantly better than Experimental I tank mixed with Larvin and Steward. Tracer tank mixed with Capture and another treatment of Experimental I also significantly differed from Experimental I tank mixed with Larvin. No statistical differences were observed among any other treatments.

Practical Application

Rynaxypyr has been shown to perform statistically better than traditional insecticides for controlling heliothines in conventional non-bt for seasonal total damage and seasonal total larvae found. Rynaxypyr applied to conventional non-bt cotton has also been shown to perform statistically similar to Bollgard II in terms of seasonal total damage and seasonal total larvae found. Rynaxypyr has also been shown to perform statistically similar to traditional insecticides in Bollgard cotton for seasonal total damage, seasonal total larvae found, and yield. These studies show that Rynaxypyr has a place in mid-south cotton production for controlling heliothines.

Acknowledgements

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References

Johnson, D.R., et al. 2004. Efficacy of Selected Insecticides for Control of Heliothines in Arkansas, 2003. *In* Proceedings Beltwide Cotton Conferences 2004. pp. 1782-1787.

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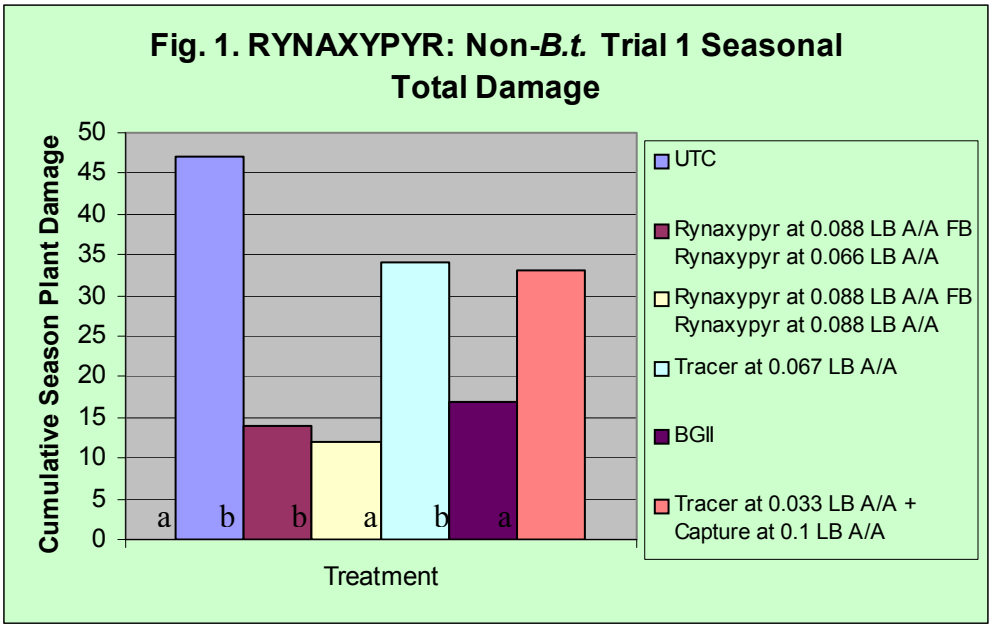
Fig. 1. RYNAXYPYR: Non-B.t. Trial 1 Seasonal Total Damage
Cumulative Season Plant Damage
50
45
40
35
30
25
20
15
10
5
0
a
b
b
a
b
a
Treatment
UTC
Rynaxypyr at 0.088 LB A/A FB Rynaxypyr at 0.066 LB A/A
Rynaxypyr at 0.088 LB A/A FB Rynaxypyr at 0.088 LB A/A
Tracer at 0.067 LB A/A
BGII
Tracer at 0.033 LB A/A + Capture at 0.1 LB A/A

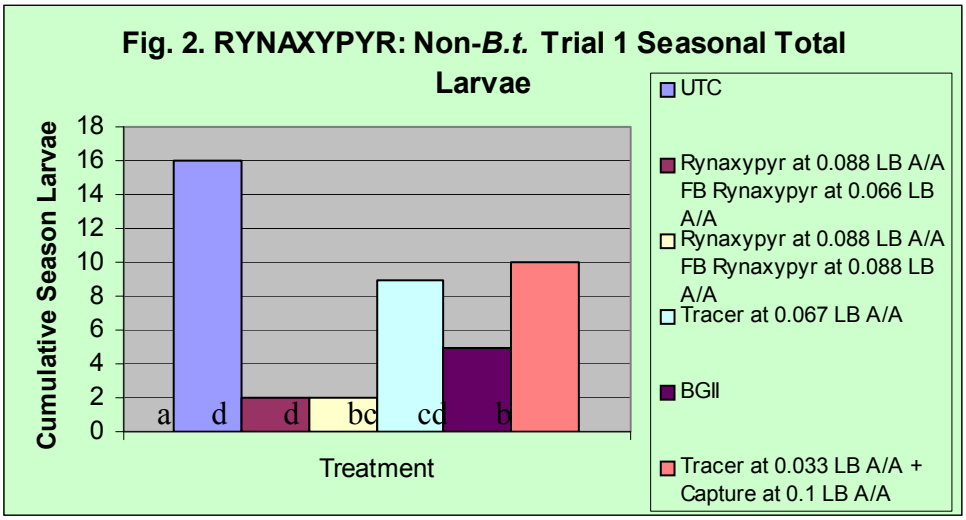
Fig. 2. RYNAXYPYR: Non-B.t. Trial 1 Seasonal Total Larvae
Cumulative Season Larvae
18
16
14
12
10
8
6
4
2
0
a
d
d
bc
cd
b
Treatment
UTC
Rynaxypyr at 0.088 LB A/A FB Rynaxypyr at 0.066 LB A/A
Rynaxypyr at 0.088 LB A/A FB Rynaxypyr at 0.088 LB A/A
Tracer at 0.067 LB A/A
BGII
Tracer at 0.033 LB A/A + Capture at 0.1 LB A/A

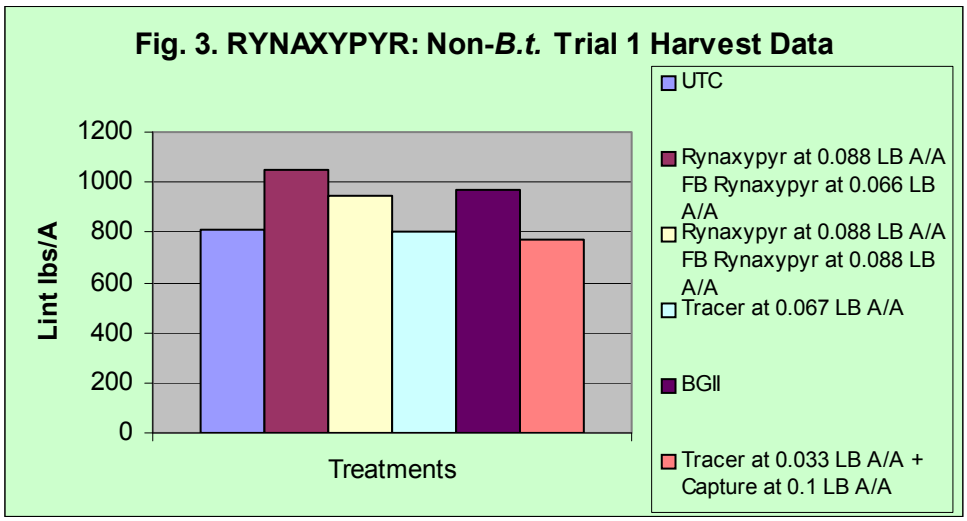
Fig. 3. RYNAXYPYR: Non-B.t. Trial 1 Harvest Data
Lint lbs/A
1200
1000
800
600
400
200
0
Treatments
UTC
Rynaxypyr at 0.088 LB A/A FB Rynaxypyr at 0.066 LB A/A
Rynaxypyr at 0.088 LB A/A FB Rynaxypyr at 0.088 LB A/A
Tracer at 0.067 LB A/A
BGII
Tracer at 0.033 LB A/A + Capture at 0.1 LB A/A

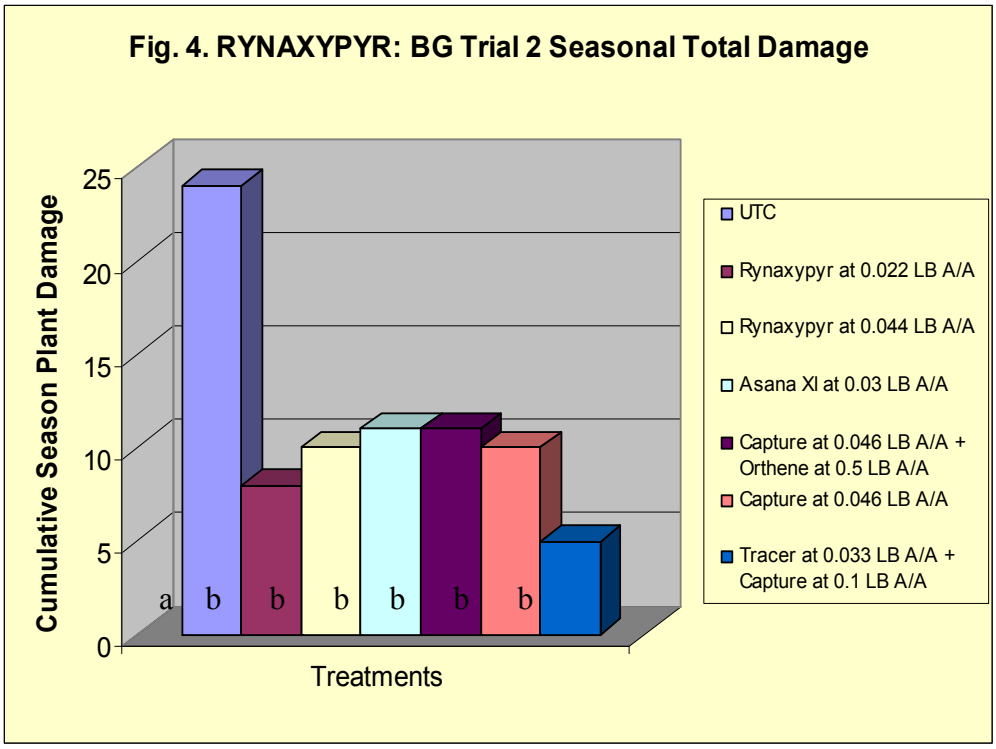
Fig. 4. RYNAXYPYR: BG Trial 2 Seasonal Total Damage
Cumulative Season Plant Damage
25
20
15
10
5
0
a
b
b
b
b
b
b
Treatments
UTC
Rynaxypyr at 0.022 LB A/A
Rynaxypyr at 0.044 LB A/A
Asana XI at 0.03 LB A/A
Capture at 0.046 LB A/A + Orthene at 0.5 LB A/A
Capture at 0.046 LB A/A
Tracer at 0.033 LB A/A + Capture at 0.1 LB A/A

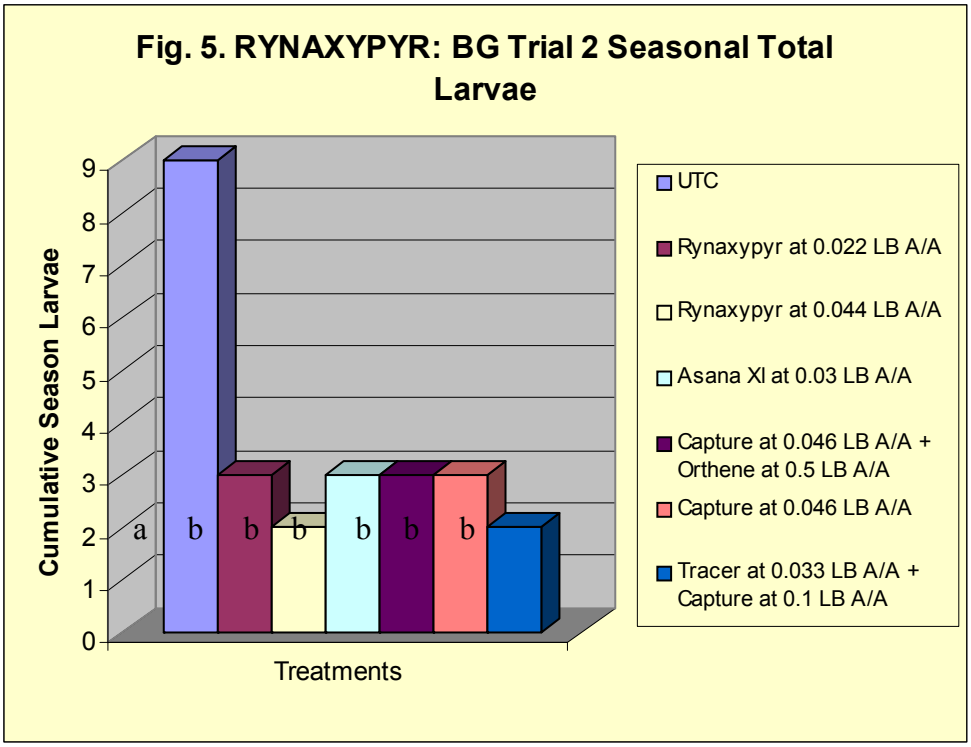
Fig. 5. RYNAXYPYR: BG Trial 2 Seasonal Total Larvae
Cumulative Season Larvae
0
1
2
3
4
5
6
7
8
9
a
b
b
b
b
b
b
Treatments
UTC
Rynaxypyr at 0.022 LB A/A
Rynaxypyr at 0.044 LB A/A
Asana XI at 0.03 LB A/A
Capture at 0.046 LB A/A + Orthene at 0.5 LB A/A
Capture at 0.046 LB A/A
Tracer at 0.033 LB A/A + Capture at 0.1 LB A/A

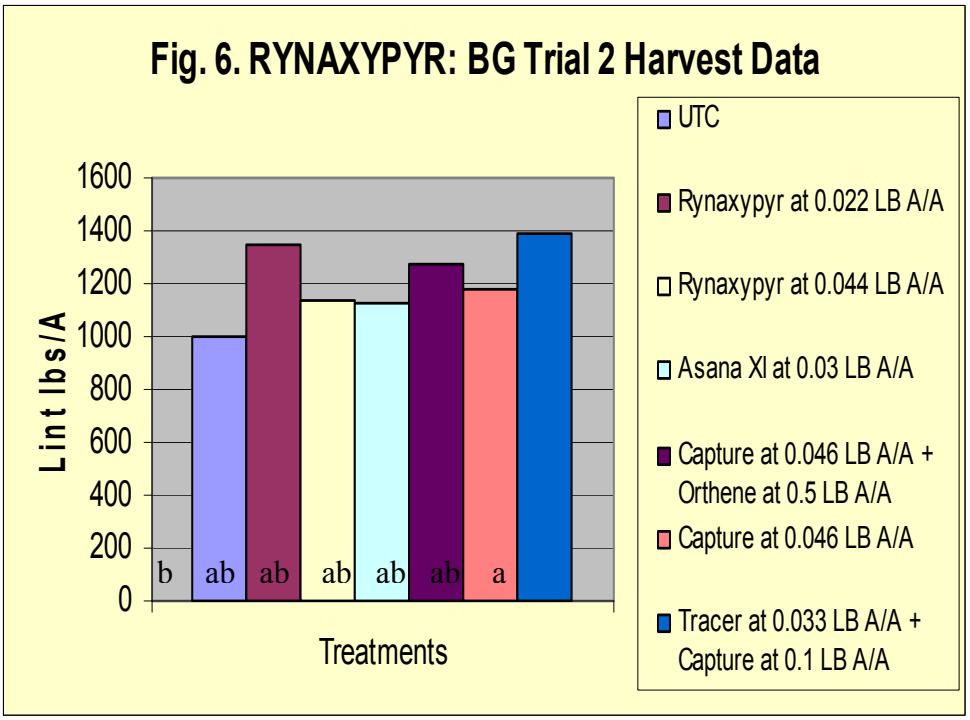
Fig. 6. RYNAXYPYR: BG Trial 2 Harvest Data
Lint lbs/A
0
200
400
600
800
1000
1200
1400
1600
b
ab
ab
ab
ab
ab
a
Treatments
UTC
Rynaxypyr at 0.022 LB A/A
Rynaxypyr at 0.044 LB A/A
Asana XI at 0.03 LB A/A
Capture at 0.046 LB A/A + Orthene at 0.5 LB A/A
Capture at 0.046 LB A/A
Tracer at 0.033 LB A/A + Capture at 0.1 LB A/A

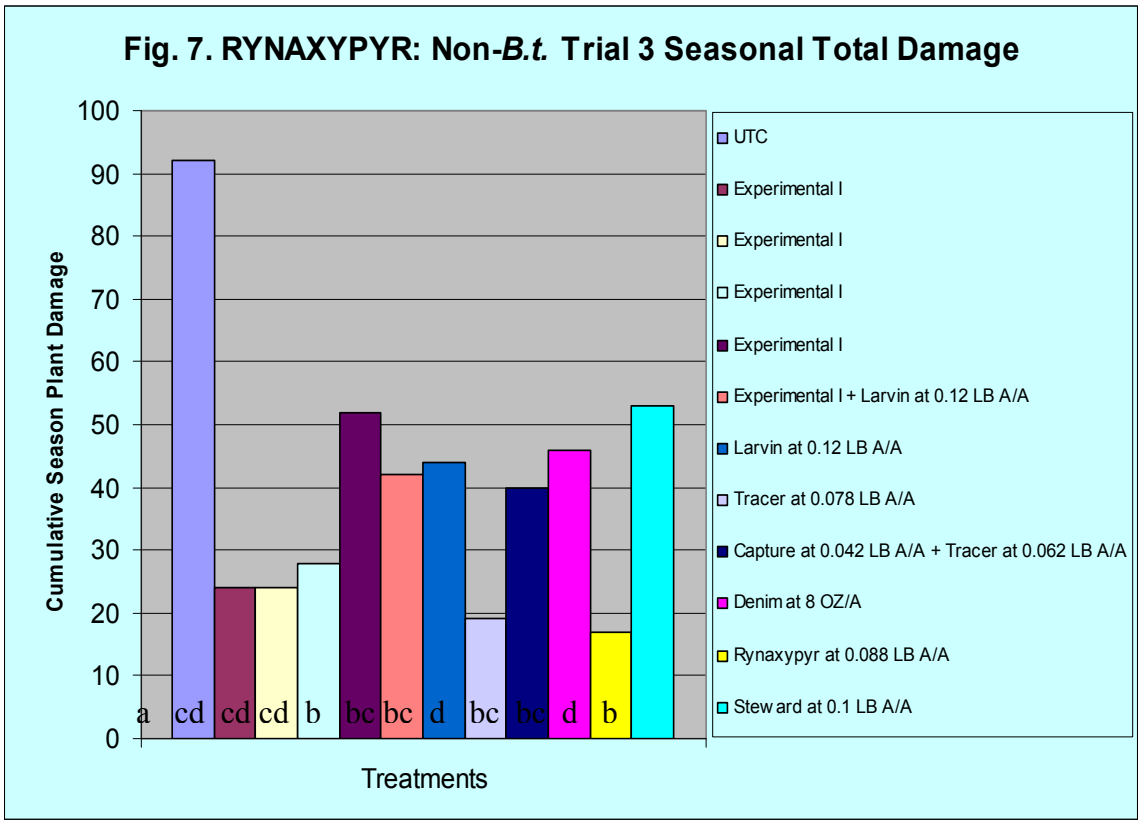
Fig. 7. RYNAXYPYR: Non-B.t. Trial 3 Seasonal Total Damage
Cumulative Season Plant Damage
100
90
80
70
60
50
40
30
20
10
0
a cd cd cd b bc bc d bc bc d b
Treatments
UTC
Experimental I
Experimental I
Experimental I
Experimental I
Experimental I + Larvin at 0.12 LB A/A
Larvin at 0.12 LB A/A
Tracer at 0.078 LB A/A
Capture at 0.042 LB A/A + Tracer at 0.062 LB A/A
Denim at 8 OZ/A
Rynaxypyr at 0.088 LB A/A
Steward at 0.1 LB A/A

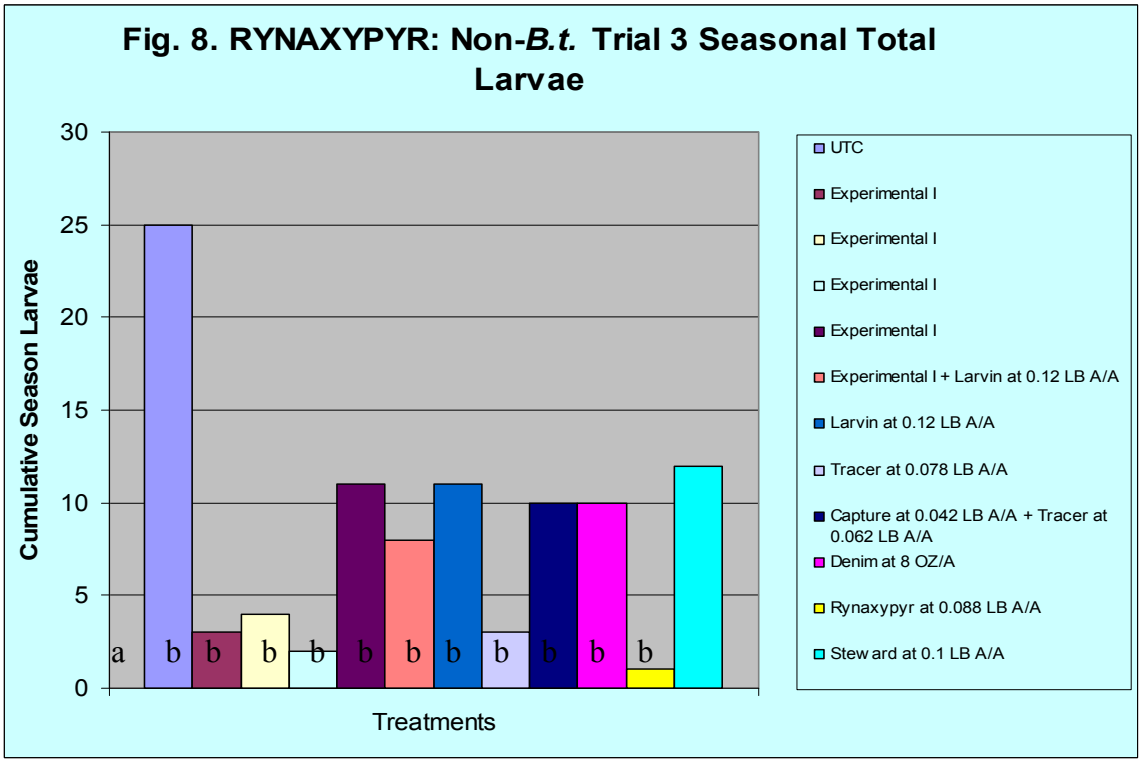
Fig. 8. RYNAXYPYR: Non-B.t. Trial 3 Seasonal Total Larvae
Cumulative Season Larvae
30
25
20
15
10
5
0
a b b b b b b b b b b b
Treatments
UTC
Experimental I
Experimental I
Experimental I
Experimental I
Experimental I + Larvin at 0.12 LB A/A
Larvin at 0.12 LB A/A
Tracer at 0.078 LB A/A
Capture at 0.042 LB A/A + Tracer at 0.062 LB A/A
Denim at 8 OZ/A
Rynaxypyr at 0.088 LB A/A
Steward at 0.1 LB A/A

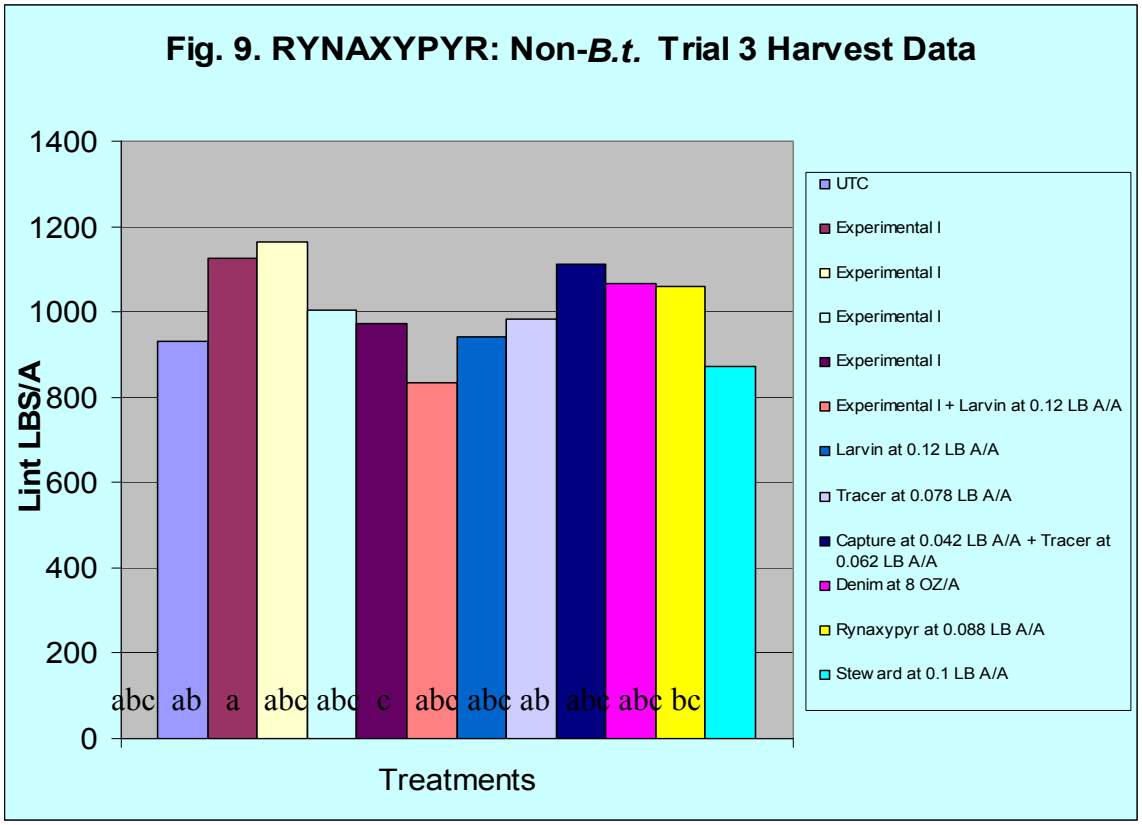
Fig. 9. RYNAXYPYR: Non-B.t. Trial 3 Harvest Data
Lint LBS/A
1400
1200
1000
800
600
400
200
0
abc ab a abc abc c abc abc ab abc abc bc
Treatments
UTC
Experimental I
Experimental I
Experimental I
Experimental I
Experimental I + Larvin at 0.12 LB A/A
Larvin at 0.12 LB A/A
Tracer at 0.078 LB A/A
Capture at 0.042 LB A/A + Tracer at 0.062 LB A/A
Denim at 8 OZ/A
Rynaxypyr at 0.088 LB A/A
Stew ard at 0.1 LB A/A