

Management of Tobacco Hornworm and Tobacco Budworm in Flue-Cured Tobacco in South Carolina

**Francis P. F. Reay-Jones, Bruce A. Fortnum
and Dewitt T. Gooden**



**School of Agricultural, Forest and Environmental Sciences
Pee Dee Research and Education Center, Florence, SC**

Tobacco Hornworm

Manduca sexta



R.J. Reynolds Tobacco Company Slide Set UGA1402127

Budworms

Heliothis virescens, Heliothis zea



P. Semtner, VT

Treat when 10% plants infested

Insecticide use on tobacco in SC

- Average of 6 applications per year from 1986 to 2011.
- Cost of insecticide + application for hornworm and budworm control:
 - = 69% of insect control costs
- Estimated 2011 SC production costs:
 - Cost of insecticides and nematicides = \$214/ac
 - Total variable costs = \$3,410/ac

Insecticides for worm control

- Warrior (lambda-cyhalothrin) 40
- Lannate (methomyl) 5
- Orthene (acephate) 3
- Sevin (carbaryl) - hornworm only 0
- Denim (emamectin benzoate) 14
- Tracer (spinosad) 3
- Bt 0



- Coragen (chlorantraniliprole) ? 1
- Belt (flubendiamide) ? 14

Pre-harvest interval

Mode of action of insecticides for worm control as classified by IRAC

- Orthene (acephate) (1A)
- Sevin (carbaryl) (1A)
- Lannate (methomyl) (1A)
- Warrior (lambda-cyhalothrin) (3A)
- Denim (emamectin benzoate) (6)
- Tracer (spinosad) (5)
- Bt (11)
- Belt (flubendiamide) (28)
- Coragen (chlorantraniliprole) (28)

New insecticides

- **Labeled:**

- Belt (Bayer; phthalic acid diamide; A.I. = flubendiamide)
- Coragen (DuPont; anthranilic diamide, A.I. = chlorantraniliprole or rynaxypyr)
- Besiege (Syngenta; chlorantraniliprole + lambda-cyhalothrin)
- Voliam Flexi (Syngenta; chlorantraniliprole + thiamethoxam) - *foliar applications*
- Durivo (Syngenta; chlorantraniliprole + thiamethoxam) - *transplant applications*
- Blackhawk (Dow AgroSciences; spinosad)

- **Not yet labeled:**

- Cyazypyr (DuPont; cyantraniliprole or cyazypyr; Trade names: Verimark, Exirel, Benevia)

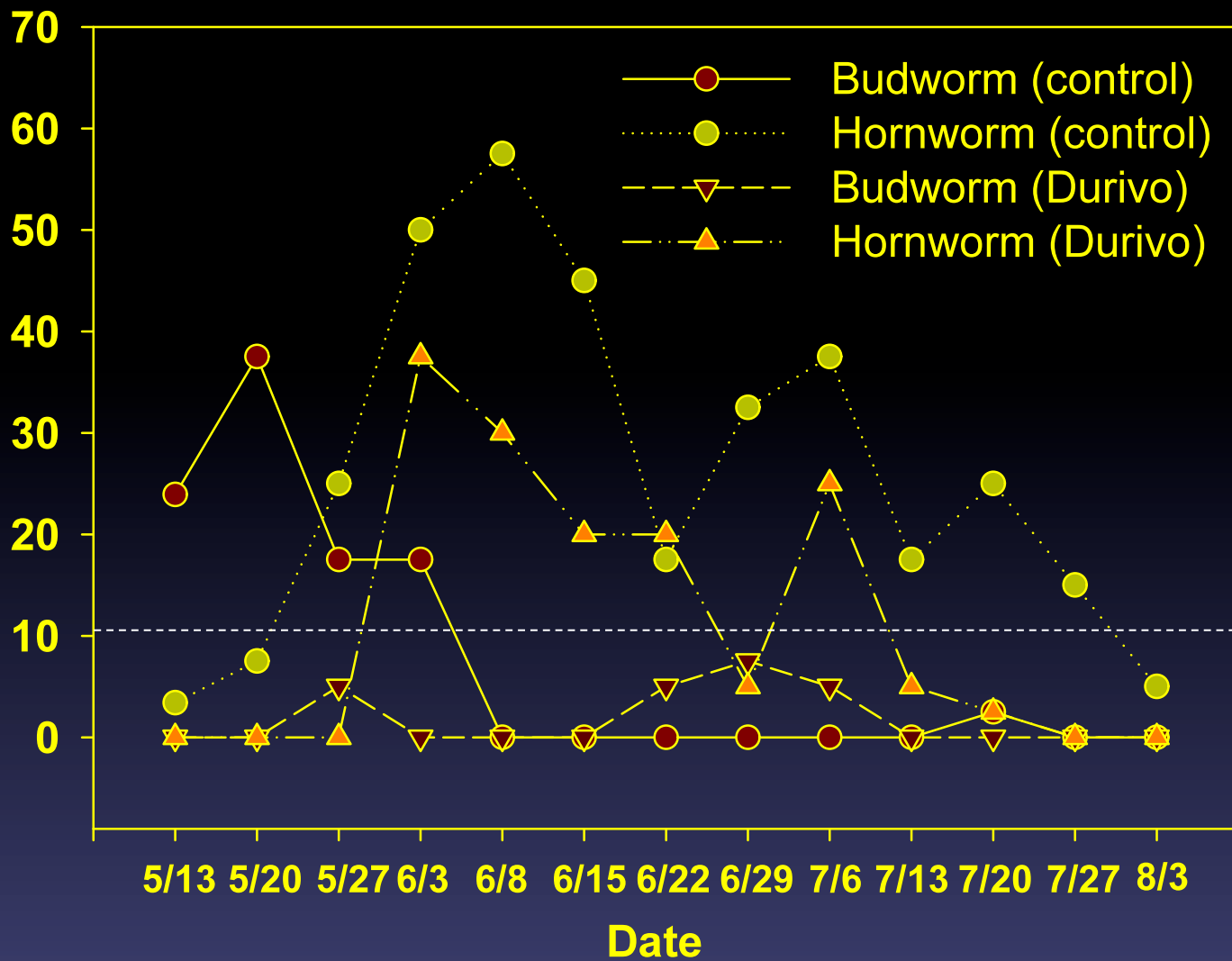


2008-2011 trials

- 2 x 40 foot rows per plot, $n = 4$ replications.
- Treatments:
 - No foliar insecticides
 - Cyazypyr (**cyantraniliprole**)
 - Coragen (**chlorantraniliprole**)
 - Tracer (**spinosad**)
 - Blackhawk (**spinosad**)
 - Belt (**flubendiamide**)
 - Javelin (**Bt**)
 - Denim (**emamectin benzoate**)
 - Besiege (**chlorantraniliprole + lambda-cyhalothrin**)
 - Voliam Flexi (**chlorantraniliprole + thiamethoxam**)
 - Durivo (**chlorantraniliprole + thiamethoxam**)



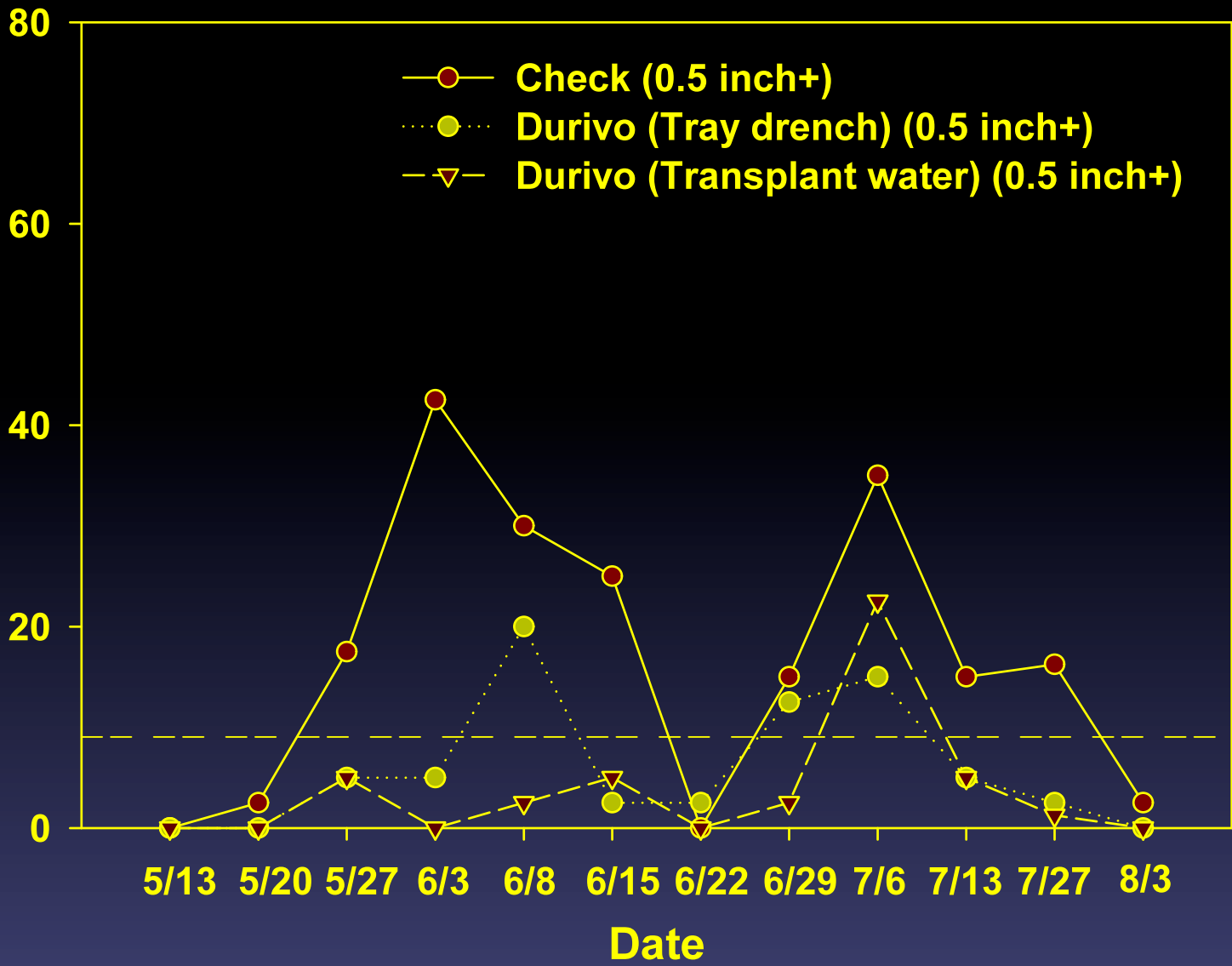
Hornworm/budworm test, Pee Dee REC, 2009



Transplanted on 4/17

Durivo: A.I. = chlorantraniliprole + thiamethoxam

Hornworm/budworm test, Pee Dee REC, 2009

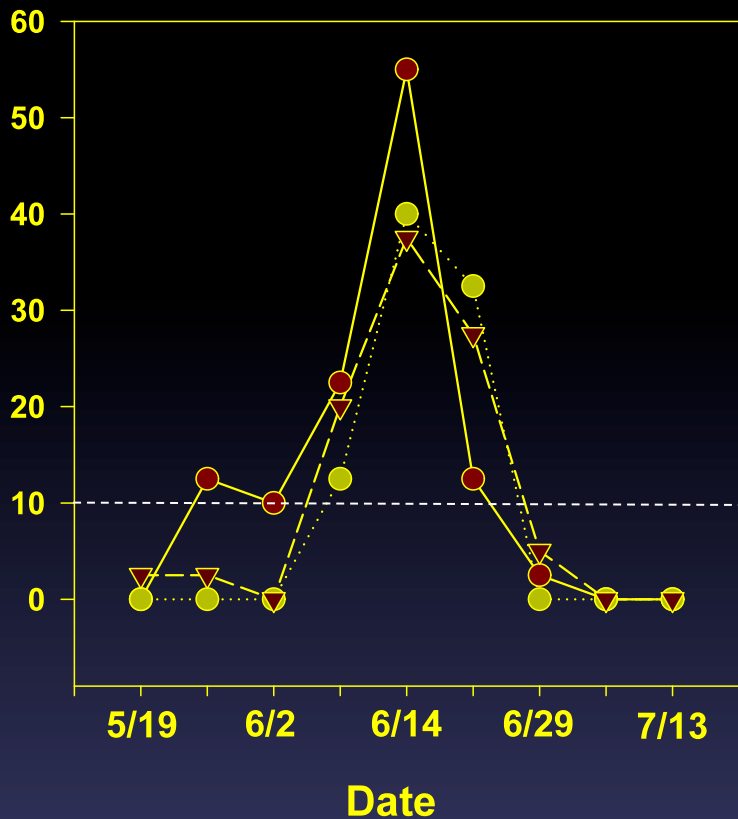


Transplanted on 4/17

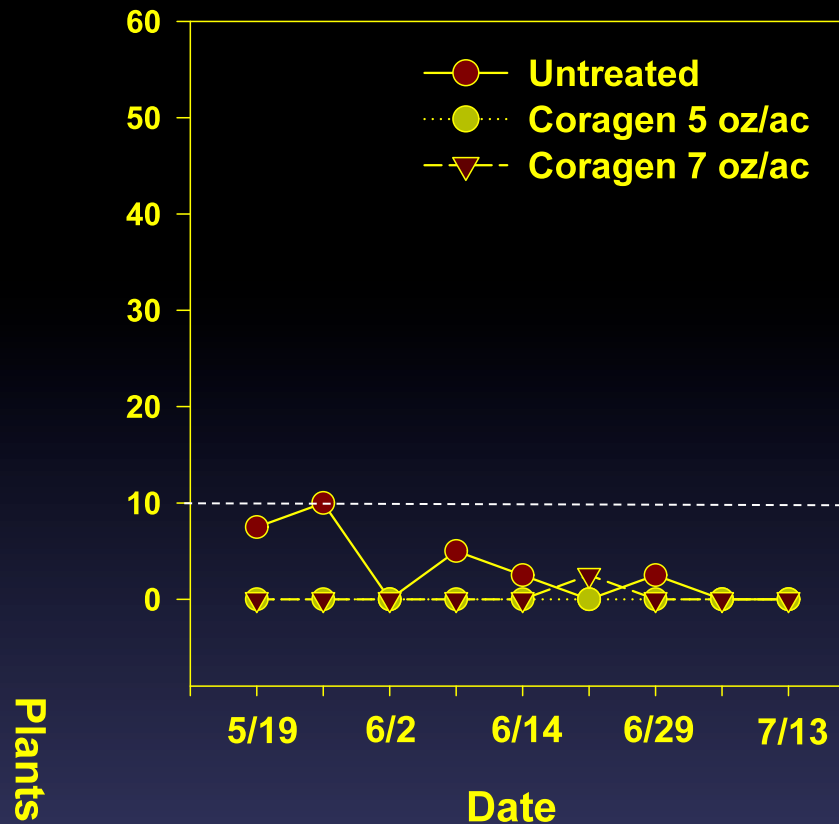
Durivo: A.I. = chlorantraniliprole + thiamethoxam

Hornworm/budworm test, Pee Dee REC, 2010

Budworms



Hornworms

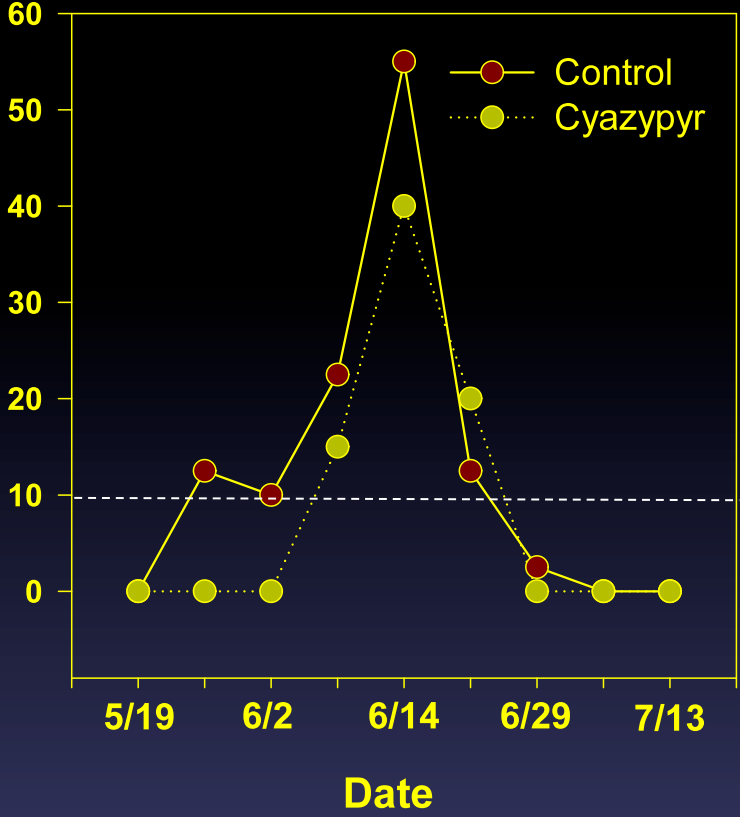


Transplanted on 4/21

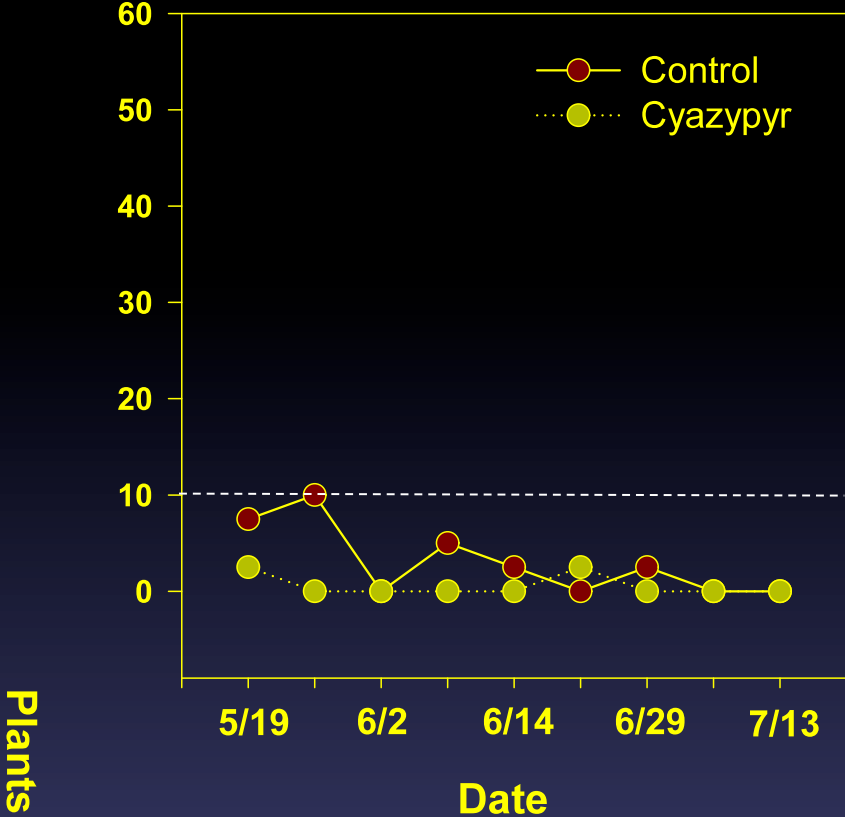
Coragen: A.I. = chlorantraniliprole

Hornworm/budworm test, Pee Dee REC, 2010

Budworms



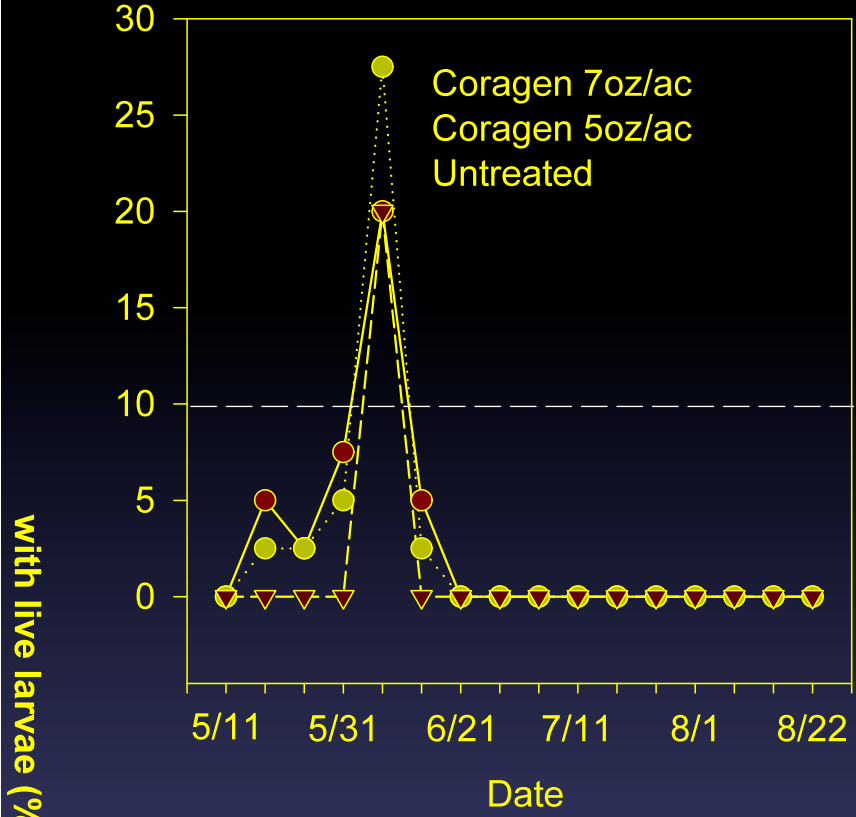
Hornworms



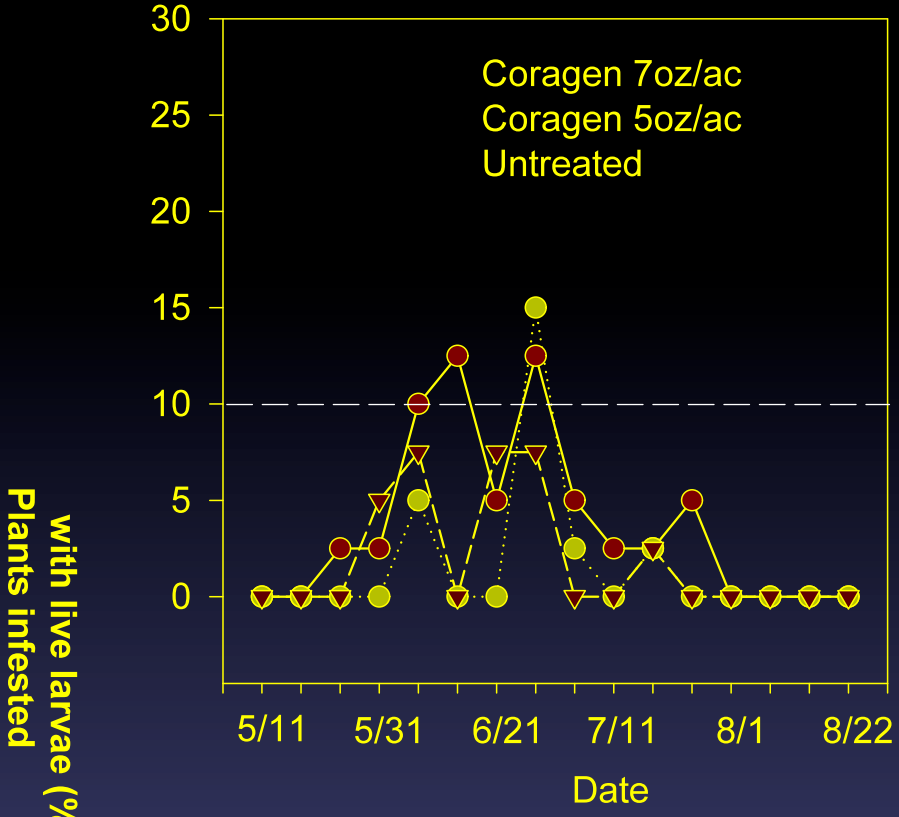
Transplanted on 4/21

Hornworm/budworm test, Pee Dee REC, 2011

Budworms



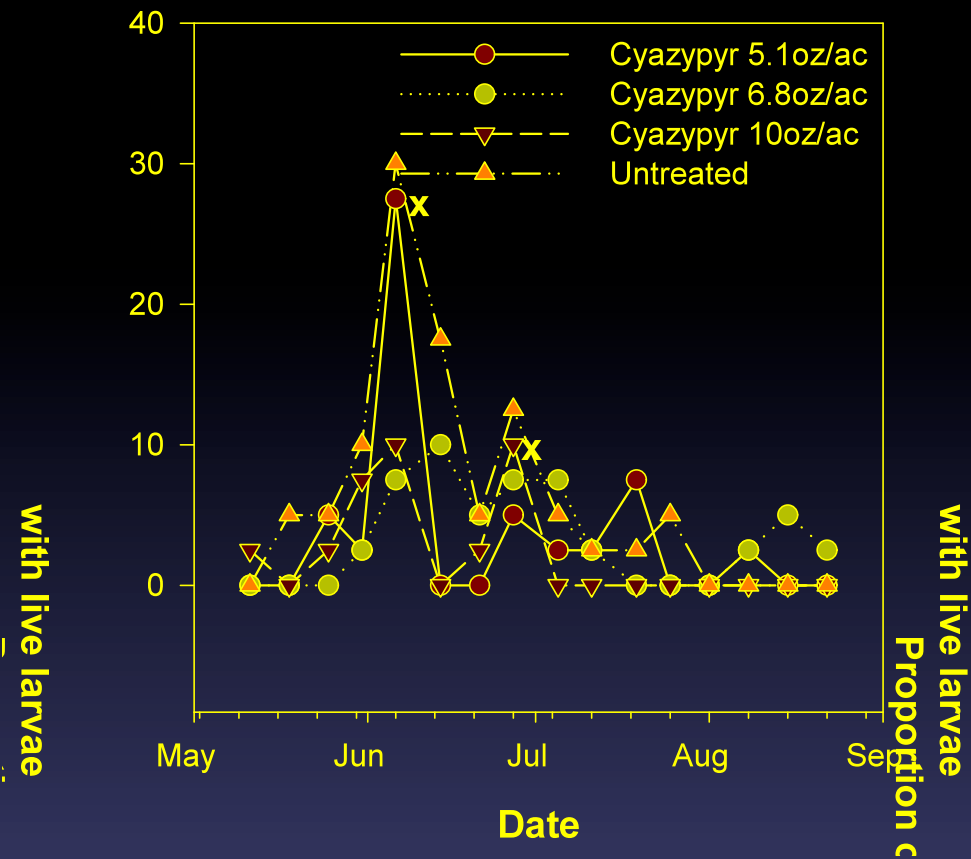
Hornworms



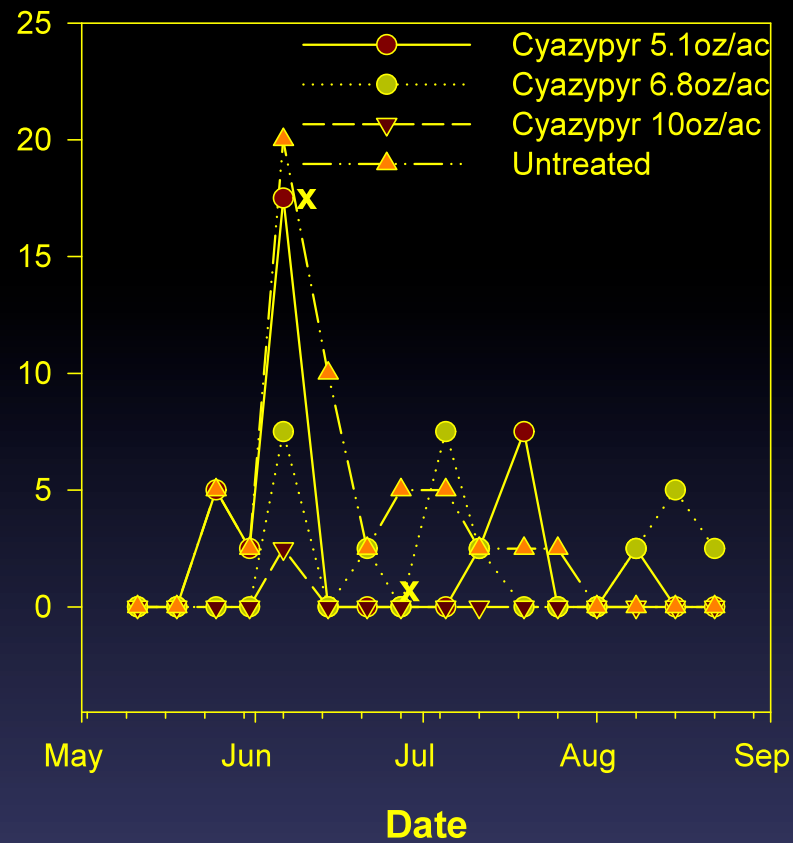
Transplanted on 4/19

Hornworm/budworm test, Pee Dee REC, 2011

Cyazypyr: larvae of all sizes



Cyazypyr: medium and large larvae



Transplanted on 4/19



Summary of hornworm/budworm insecticide trials at Pee Dee REC, Florence, SC, 2008-2009

- In 2008, at threshold (10% plants infested):
 - 5 applications of Tracer (2 oz)
 - 3 applications of Belt (3 oz)
 - 3 applications of Coragen (all 3 rates)
- In 2009, at threshold:
 - 3 applications of Tracer (2 oz)
 - 3 applications of Belt (3 oz)
 - 2 applications of Coragen (both rates)
 - 2 applications of Voliam Flexi (both rates)
 - 2 applications of Besiege (both rates)
 - 2 applications of Cyazypyr (both rates (not labeled))

Summary of hornworm/budworm insecticide trials at Pee Dee REC, Florence, SC, 2010

- Foliar applications at threshold:
 - 2 applications of Coragen (both rates)
 - 3 applications of Cyazypyr (new DuPont product)
 - 2-3 applications of Belt
 - 3 applications of Voliam Flexi (both rates)
 - 2-3 applications of Voliam Xpress (both rates)
 - 4 applications of Tracer

Summary of hornworm/budworm insecticide trials at Pee Dee REC, Florence, SC, 2011

- In 2011, at threshold (10% plants infested):
 - 3 applications of Tracer (2 oz)
 - 4 application of Blackhawk (2.5 oz)
 - 2 application of Blackhawk (3.3 oz)
 - 2 applications of Belt (both rates)
 - 2 applications of Coragen (both rates)
 - 2 applications of Besiege (7 oz)
 - 1 application of Besiege (9 oz)
 - 3 applications of Denim (10 oz)
 - 4 applications of Javelin
 - 2 applications of Cyazypyr (both rates (not labeled))

Yield

- Green weight not significantly affected by treatment (2008-2011).
- Cured yield and quality not significantly affected by treatment (2011).

Summary of results

- New insecticides Coragen and Belt provide excellent control of hornworms and budworms.
- Transplant water applications of chlorantraniliprole provide 6-8 weeks control of budworms and hornworms.
- Can we improve efficacy by getting the product to the roots later in the season when worm pressure is high?

Acknowledgements

- Funding:
- South Carolina Tobacco Board
- DuPont
- Bayer CropScience
- Syngenta Crop Protection
- Dow AgroSciences
- William Griggs, Terry Teal, and Karen Barefoot, for assistance with field work.

