2006 Beltwide Cotton Conferences, San Antonio, Texas - January 3 - 6, 2006

CLOTHIANIDIN - A NEW SEED TREATMENT INSECTICIDE FOR COTTON FROM BAYER CROPSCIENCE

Alan Hopkins
Bayer CropScience
Greenbrier, AR
Charles Graham
Bayer CropScience
Grenada, MS
Mike Schwarz
Bayer CropScience
RTP, NC
Chris Kleyla
Bayer CropScience
Research Triangle Park, NC

ABSTRACT

Clothianidin is under development by Bayer CropScience as a seed-treatment insecticide for cotton. Registration by the US EPA for use as a seed treatment on cotton is anticipated in time for commercial use in 2006. Recent testing indicates a good commercial fit for a combination of clothianidin and imidacloprid as an insecticide seed treatment for cotton. A summary of results from several independent sources is presented in this paper with a focus on efficacy against important early-season pests of cotton in the Southern and Southeastern cotton-growing region of the United States.

Introduction

Clothianidin is in the class of insecticides known as chloronicotinyl (CNI, *syn. neonicotinoid*). The active ingredient (clothianidin) was introduced as a seed treatment in U.S. corn in 2003. Sold under the tradename PONCHO™, it has been widely accepted for control of several important insect pests of corn. Bayer CropScience was the first to introduce this class of insecticides to the cotton industry when imidacloprid was registered as an insecticide seed treatment for cotton in 1994. Clothianidin and imdacloprid have similar physico-chemical properties such as near-optimum water solubility and excellent systemic properties that make these active ingredients well suited for seed treatment use. They are both active against several important early-season insects such as tobacco thrips (*Frankliniella fusca*), soybean thrips (S*ericothrips variabilis*), onion thrips (*Thrips tabaci*) and cotton aphid (*Aphis gossypii*). Additionally, clothianidin has excellent efficacy against black cutworm (*Agrotis ypsilon*). Therefore, a combination of both active ingredients enhances the insecticidal spectrum and provides cotton growers with advancement in cotton seed treatment technology. Data from several independent sources, primarily land-grant universities, support the continued development and subsequent commercialization of the combination of clothianidin and imidacloprid as an insecticide seed treatment for cotton. Registration for clothianidin is expected in the first quarter of 2006. Commercial use of the combination product will likely be very limited in 2006. Bayer CropScience will continue to offer GUACHO GRANDE™ (imidacloprid) as a seed treatment.

Results and Discussion

Cutworm Control

A laboratory experiment conducted by Bayer CropScience (formerly Gustafson) in 2001 provided excellent confirmation of the activity of clothianidin against black cutworm (Table 1). One cutworm larva was placed in a glass cylinder with a single seedling for each treatment. Treatments were replicated four times. Mortality was rated four days after exposure. Clothianidin at either 1250 ppm or 2500 ppm significantly increased cutworm mortality compared to the fungicide-treated control. Imidacloprid and thiamethoxam treatments did not differ from the untreated control.

Table 1. Influence of clothianidin, imidacloprid and thiamethoxam seed treatment on black cutworm mortality 4 days after exposure to treated seedlings.

Treatment	Larvae Mortality after 4 days*
Fungicide Control	2.25
Clothianidin (1250 ppm)	4.5[x]
Clothianidin (2500 ppm)	4.75 [x]
Imidacloprid (1250 ppm)	2.25
Imidacloprid (2500 ppm)	2.25
Thiamethoxam (3000 ppm)	2.25

* Mortality Rating: 1 = Living, 5 = Dead.
[x] Significant at $p \leq 0.05$

Thrips Control

Researchers and extension specialists from several different universities have evaluated a combination of clothianidin and imidacloprid for control of thrips on seedling cotton. Data from these trials demonstrate excellent control of thrips and subsequent reduction in thrips damage with the combination of clothianidin and imidacloprid. Comparable performance against thrips was also observed for standards, imidacloprid and thimethoxam (Table 2).

Table 2. Average thrips damage ratings from 13 university trials conducted in 2004 and 2005.

Treatment	Thrips Damage Rating*
Control	3.98
Imidacloprid	1.29
Thiamethoxam	1.78
Clothianidin & Imidacloprid	1.35

* Damage Rating: 1 = No Damage, 5 = Complete Plant Death.

Conclusions

Results from laboratory and field studies support the continued development and commercialization of a combination of clothianidin and imidacloprid applied as a seed treatment. The combination will provide control of thrips and aphids comparable to imidacloprid alone and will provide the additional benefit of cutworm control.