STEWARD™ INSECTICIDE: A NOVEL BROAD SPECTRUM COMPOUND FOR COTTON

Dan Sherrod, Walt Mitchell and Glenn Hammes
DuPont Agricultural Products

DuPont Agricultural Products is developing Steward™ insecticide and the registration package is under review by U.S. EPA. Steward™ controls all major worm pests plus plantbug while helping you protect beneficials and your cotton crop. Steward™ is under EPA review as a reduced risk pesticide candidate and registration for cotton is pending.

The product description of Steward™:

Common name: Indoxacarb (active ingredient)
Chemical class: Oxadiazine
Testing code: DPX - MPO62
Formulation: 1.25 lb. ai/gal SC (oil formulation)
Signal word: Caution
Mode of action: Novel

Indoxacarb has a unique mode of action unlike any current insecticide product. Indoxacarb is a Sodium channel blocker: it interferes with a group of ion channels by inhibiting the flow of sodium into nerve cells causing paralysis and death of pests. There is no evidence of cross resistance of indoxacarb to any current insecticide products. The primary activity of indoxacarb it through ingestion of treated foliage; it is also absorbed through the insect cuticle. Feeding inhibition occurs in 0-4 hours, feeding stops quickly thus providing excellent crop protection. Paralysis and death of the target pest typically occurs in 4-48 hours.

Steward™ will be formulated as suspension concentrate with 1.25 lbs. active ingredient per gallon of formulation. Key cotton worm pests controlled by Steward™ include beet armyworms, cabbage looper, cotton bollworm, soybean looper, tobacco budworm, and fall armyworm. Steward also provides control of tarnished plant bug and cotton fleahopper. Application rates for control of armyworms, tarnished plant bug, and cotton fleahopper will be 0.09 – 0.11 lb. ai/acre (9.2 – 11.3 fl. oz. product). An application rate of 0.11 lb. ai/acre (11.3 fl. oz. product) should be used for cotton bollworm and tobacco budworm and rates of 0.065 - 0.09 lb. ai/acre (6.6 – 9.2 fl oz. product) for soybean and cabbage looper.

Pending EPA review of the proposed Steward™ label, we expect the label to have the following directions for use. A total of 4 applications at the high use rate of 11.3 fl. oz. product (45.2 fl.oz. per acre per season) can be made per acre per season. Both air and ground applications are allowed. The minimum spray interval will be 5 days. The Restricted Entry Interval (REI) will be 12 hours and the preharvest interval (PHI) will be 14 days.

(Refer to tables)

Summary

Steward™ at labeled rates can provide from ***5*** to ***14*** days residual protection of treated leaves, squares, and bolls depending on the insect pest, population pressure, crop, and environmental conditions. Due to the insecticidal potency of Steward™, low levels of residual active on the plant may continue to provide good crop protection. Steward™ is not systemic and does not protect new growth nor does it redistribute readily on the surface of the leaf once sprayed.

Steward™ has very low impact on key predators/ parasites and non-target beneficials. In addition, under field conditions, Steward™ poses no significant risk to honey bees and bumblebees foraging after spray have dried.

Steward should provide the following benefits to the U.S. cotton producer:

New chemistry, unique mode of action
Broad-spectrum Lepidoptera (worm) insecticide
Active against tarnished plant bug and fleahopper
Quick crop protection through feeding cessation
Excellent crop safety
Low mammalian toxicity
Favorable environmental/ecological profile
Minimal impact on most beneficial insects and non-target organisms
Active at low use rates
Effective against resistant pests
Excellent Resistance management tool, Good fit in IPM programs

The following tables provide multi-year summaries of field trials conducted with Steward™ for control of key worm pests of cotton.

Table 1. Results of University Field Trials for Control of Budworm/Bollworm in the Mid-South : 3 Year Summary

Treatment	Rate (lb. ai/acre)	% Damaged Squares		
Steward	0.09		4	3.7
Steward	0.11	3.6		2.7
Tracer	0.067	4.9	4.3	4.4
Untreated		17.6	18.3	18.4
No. Trials*		9	8	7

* Trials with direct rate to rate comparisons; trials conducted in 1997-1999.

Reprinted from the *Proceedings of the Beltwide Cotton Conference*
Volume 1:96-97 (2000)
National Cotton Council, Memphis TN

Table 2. Results of Field Trials for Control of Cabbage & Soybean Looper: 3 Year Summary

Treatment	Rate (lbs. ai/acre)	Loopers No. larvae/100 Ft.	% Control vs. Untreated*
Steward	.065	93	86% (10)
Steward	.09	66	89% (10)
Steward	.11	16	98% (7)
Tracer	.063	153	76% (10)
Pirate	.2	91	86% (11)
Untreated		695	

Numbers in ( ) represent the number of field trials conducted 1997 - 1999

Table 3. Results of Field Trials for Control of Beet & Fall Armyworm

Treatment	Rate (lb. ai/acre)	BAW No. larvae/100ft	BAW % Control	FAW No. larvae/100ft	FAW % Control
Steward	.09	18	89%(11)	8	85%(2)
Steward	.11	14	98% (8)	9	82%(2)
Tracer	.063	25	76%(11)	20	44%(3)
Pirate	.2	15	93%(8)	NT	NT
Untreated		326	11 tests		2 tests

Table 4. Yield Comparisons for Steward from Field Trials Conducted in the Midsouth: 2-Year Average

Treatment	Rate(lb. ai/acre)	Seed Cotton Yield/ac.*	% Yield Compared to Check
Steward	0.09	1,333	136%
Steward	0.11	2,036	145%
Tracer	0.067	1,971	140%
Check	-----	745	-----

*Average of 12 studies

Table 5. Yield Comparisons for Steward from Field Trials Conducted in the Southeast: 2-Year Average

Treatment	Rate (lb. ai/acre)	Lint Yield lbs. / acre	Lint Yield Compared to Check
Steward	.09	1130 lbs.	+185 lbs.
Steward	.11	1089 lbs.	+145 lbs.
Tracer	.063	1038 lbs.	+138 lbs.
Check		945 lbs.	Untreated