Water- and Drill-Seeded Tests of Dinotefuran

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A granular formulation of dinotefuran, a neonicotonoid insecticide, was tested against rice water weevil larvae in a water-seeded and a drill-seeded experiment in 2004. The timing of application was approximately 2 ½ weeks after flooding in both experiments (in other words, a use pattern similar to that of carbofuran).

Water-seeded experiment

Location: Rice Research Station, Crowley, La.

Soil Type: Crowley Silt Loam (ph 6.0, Clay 12%, Silt 71%, Sand 17% CEC 9.4 mole/kg)

Variety: Cocodrie
Seeding Rate: 140 lbs/ac

Plot Size: 4 x 18 ft; plots surrounded by metal flashing to retard water movement

Planting Method: Water seeded
Date: 05/05/04

Fertilization/Weed Control: Standard practices

Experimental Design: Randomized complete block; 5 treatments, 4 replications

Treatments:

1. Untreated control (UTC)
2. Icon @ 0.04 lbs Active Ingredient per Acre (AI/A)
3. Dinotefuran 1.5% granule @ 200g AI/hectare (AI/ha) – low rate
4. Dinotefuran 1.5% granule @ 300 g AI/ha – mid rate
5. Dinotefuran 1.5% granule @ 600 g AI/ha – high rate

Dinotefuran applications made 17 d after flooding

Water Management:
Planting flood: 05/05/04
Drained: 05/10/04
Flushed: 05/12/04
Permanent Flood: 05/24/04 (rice at 3-leaf stage)
Drained: 07/26/04

Insecticide:

Name: Icon	Name: Dinotefuran 1.5% granule
Method: Seed treatment	Method: Shaker jar, by hand
Date: 5/5 (at planting)	Date: 6/10/04 (17 d after flooding, daf)
Rate: 0.04 lbs AI/A	Rate: see above

Sampling:
Cores/plot: 3 core samples per plot

Date: 6/14 (21 daf, 4 d after dinotefuran applications); 6/28 (35 daf; 18 d after dinotefuran)

Data analysis:
Mean number of larvae per core calculated for each plot based on 3 core samples at each sampling date
Treatment effects on number of larvae per core analyzed by PROC MIXED; treatment as fixed effect, block as random effect; Tukey mean separation

Results:

	Larvae per core sample (± S.E.) on	
	6/14/04	6/28/04
Treatment	(4 d after application)	(18 d after application)
UTC	12.2 ± 2.6	13.2 ± 3.0
Icon	15.8 ± 2.0	10.7 ± 2.0
Dinotefuran – low rate	8.3 ± 1.0	**2.3 ± 0.2 ***
Dinotefuran – mid rate	9.0 ± 1.3	**2.7 ± 1.9 ***
Dinotefuran – high rate	4.9 ± 1.1	**1.1 ± 0.2 ***

* Means in bold and denoted with an asterisk are significantly different from mean for UTC for the indicated core sampling date (Tukey)

Type III tests of fixed effects:
Core sampling 1: $F_{4,14} = 5.69$; Pr > F = 0.0062
Core sampling 2: $F_{4,14} = 9.41$; Pr > F = 0.0007

Drill-seeded experiment

Location: Rice Research Station, Crowley, La.

Soil Type: Crowley Silt Loam (ph 6.0, Clay 12%, Silt 71%, Sand 17% CEC 9.4 mole/kg)

Variety: Cocodrie
Seeding Rate: 90 lbs/ac

Plot Size: 4 x 18 ft; plots surrounded by metal flashing to retard water movement

Planting Method: Drill seeded
Date: 05/27/04

Fertilization/Weed Control: Standard practices

Experimental Design: Randomized complete block; 7 treatments, 4 replications

Treatments:
1. Untreated control (UTC)
2. Icon @ 0.04 lbs Active Ingredient per Acre (AI/A)
3. Dinotefuran 1.5% granule @ 200g AI/hectare (AI/ha) – low rate

4. Dinotefuran 1.5% granule @ 300 g AI/ha – mid rate
5. Dinotefuran 1.5% granule @ 600 g AI/ha – high rate
6. Furadan @ 0.6 lbs AI/A, applied at the same time as dinotefuran
7. Additional control plots (ACP) —6 untreated plots were located in a separately-leveed area approximately 25 feet from the main test in response to the concern that the metal flashing around plots was insufficient to prevent movement of insecticide in water to surrounding plots

Dinotefuran and carbofuran applications were made 18 d after flooding

Water Management:
Flushed: 05/31/04
Permanent Flood: 06/18/04 (rice at 3-4 leaf stage)
Drained: 09/07/04

Insecticide:

Name: Icon	Name: Dinotefuran 1.5% granule
Method: Seed treatment	Method: By hand, shaker jar
Date: 5/27 (at planting)	Date: 7/6/04 (18 d after flooding, daf)
Rate: 0.04 lbs AI/A	Rate: see above

Sampling:
Cores/plot: 3 core samples per plot
Date: 7/9 (21 daf, 3 d after dinotefuran applications); 7/16 (28 daf, 10 d after dinotefuran); 7/23 (35 daf, 17 d after dinotefuran)

Data analysis:
Mean number of larvae per core calculated for each plot based on 3 core samples at each sampling date
Treatment effects on number of larvae per core analyzed by PROC MIXED; treatment as fixed effect, block as random effect; Tukey mean separation

Results:

	Larvae per core sample (± S.E.) on		
	7/9/04	7/16/04	7/23/04
Treatment	(3 d after application)	(10 d after application)	(17 d after appl'tion)
UTC	12.0 ± 0.8	34.6 ± 3.8	17.7 ± 3.5
ACP	18.1 ± 1.2	20.5 ± 2.3	20.6 ± 1.7
Icon	10.7 ± 0.8	**9.8 ± 0.9***	8.5 ± 1.3
Furadan	9.8 ± 1.3	**8.0 ± 3.3***	10.4 ± 0.7
Dinotefuran – low rate	15.3 ± 3.4	27.2 ± 3.0	15.8 ± 1.8
Dinotefuran – mid rate	13.3 ± 1.0	**18.7 ± 3.2***	10.2 ± 3.0
Dinotefuran – high rate	12.8 ± 1.6	**9.5 ± 1.8***	7.6 ± 2.7 **

* Means in bold and denoted with an asterisk are significantly different from mean for UTC for the indicated core sampling date (Tukey)
** P = 0.06

Type III tests of fixed effects:

Core sampling 1: $F_{6,22} = 3.47$; Pr > F = 0.01
Core sampling 2: $F_{6,22} = 12.75$; Pr > F = 0.0001
Core sampling 3: $F_{6,22} = 5.64$; Pr > F = 0.001

Comments

Comments, water-seeded experiment: Significant treatment effects on both core sampling dates indicate that application of Dinotefuran significantly reduced larval densities. Poor performance of Icon probably resulted from treating seed by hand when wet and seeding too soon after treatment. Reduction in larval densities was greater 18 d after application than 4 d after application, suggesting that the insecticidal activity of Dinotefuran is slow. The high rate of Dinotefuran reduced larval densities 60% 4 d after application and 92% 18 d after application.

Comments, drill-seeded experiment: Significant treatment effects on all core sampling dates suggest that application of Dinotefuran significantly reduced larval densities. Poor performance of all insecticides on first and third sampling dates was probably due to high weevil populations. Reductions in larval densities were greater 10 and 17 d after application than 3 d after application. The high rate of Dinotefuran reduced larval densities 73% 10 d after application