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Corn Rootworm Insecticide Performance

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Abstract
The objective of our testing program is to monitor the performance of registered insecticides and evaluate new chemical and transgenic tools that are more economical, efficacious, and environmentally compatible. Labeled corn rootworm insecticides are evaluated yearly on university research farms and the farms of private growers. 2000 data from the Crawfordsville SE Research Farm, a 2000 summary, and a 3-year summary are presented in this report.

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Introduction

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Labeled corn rootworm insecticides are evaluated yearly on university research farms and the farms of private growers. 2000 data from the Crawfordsville SE Research Farm, a 2000 summary, and a 3-year summary are presented in this report.

Materials and Methods

Corn was planted no-till 3 May in an area that had been planted to a corn rootworm beetle “catch crop” (high populations of late-planted corn) the previous year. The experimental design was a randomized complete block, with treatments applied to single 50-ft rows and replicated four times. Granular and liquid planting-time insecticide formulations were applied with modified application equipment mounted on a four-row John Deere 7100 planter (30-inch row spacing). On June 6, liquid Furadan 4F post-emergence insecticide was applied with a small-plot bicycle sprayer. On July 17, corn root systems were dug, washed, and rated for damage on the following Iowa State Node-Injury Scale: 1.00 equals one node (circle or roots), or the equivalent of an entire node, eaten back to within approximately two inches of the stalk; 2.00 equals two nodes eaten; and 3.00 equals three nodes eaten. Damage in-between complete nodes eaten is noted as the percentage of the node missing (i.e. 0.25 = $^1/_4$ of one node eaten, 0.50 = $^1/_2$ node eaten, 1.25 = $1^1/_4$ nodes eaten, etc). The Node-Injury scale allowed us to additionally calculate a precise product performance consistency using individual root ratings. Product consistency equals the percentage of times a treatment limited feeding damage to 0.25 ($^1/_4$ of a node eaten) or less. It is very desirable to limit feeding damage to no more than a quarter node. With no more than $^1/_4$ node eaten, a plant will have an adequate root system to achieve its maximum yield potential, even under moisture stress conditions.

Results and Discussion

The following table lists results from the 2000 Crawfordsville test, a 2000 summary from tests conducted throughout the state, and a multi-year (1998-2000) summary. The summaries provide the best overall product evaluations. In these summaries, only those replications that had sufficient larval feeding to challenge a product’s performance are included. Replications that had an untreated check replication mean rating of less than 0.75 ($^3/_4$ node eaten) were deleted from the analyses. Also, the summaries help present the “big picture,” because products were tested in a variety of soil types, tillages, fertilities, corn rootworm pressures, and environmental conditions.

A word of caution is in order when interpreting the 2000 results from Crawfordsville. The CHECK “worked” 36% of the time, indicating this was not a really strong test. The check received a Node-Injury rating of 0.81 nodes eaten (light feeding pressure). Over the years, most insecticides will not provide 100% consistency; the exception may be the transgenic seeds we are presently testing. A product consistency rating of 75% or higher “over years” is very acceptable. The new seed treatments, ProShield and Prescribe, were ineffective in preventing corn rootworm feeding damage during this first year of testing. Neither product was significantly different from the CHECK. The other new insecticide tested this year, Capture 2EC (a liquid pyrethroid), had a 75% product consistency in the 2000 summary.

Table 1. Percentage of time products kept root injury below the economic injury level. Side-by-side comparisons of insecticide performance, Iowa State University.

Insecticide	Placement[2]	Product Consistency (%)[1] Crawfordsville Only 2000[3,6]	Six-Test Summary 2000[4,6]	15-Test Summary 1998-2000[5,6]
Force 3G	Furrow	92 a	94 a	91 a
Aztec 2.1G	Furrow	92 a	91 a	88 a
Aztec 2.1G	T-band	100 a	96 a	87 ab
Force 3G	T-band	100 a	96 a	84 abc
Counter 20CR	T-band	100 a	89 ab	79 abc
Counter 20CR	Furrow	100 a	76 abc	76 abc
Fortress 5G	Furrow SB	100 a	86 abc	73 bc
Capture 2EC	T-band	92 a	75 abc	----
Lorsban 15G	T-band	100 a	83 abc	70 cd
Furadan 4F	B'cast-nc	100 a	67 bcd	70 cd
Fortress 5G	T-band SB	92 a	95 a	69 cd
Lorsban 15G	Furrow	100 a	65 cd	57 d
Thimet 20G	T-band	92 a	66 bcd	57 d
Regent 4SC	Furrow-M	100 a	51 d	56 d
ProShield ST	ST	67 ab	22 e	----
Prescribe ST	ST	58 ab	9 e	----
CHECK	----	36 b	13 e	10 e

[1] Product consistency = percentage of time Iowa State Node-Injury rating was 0.25 ($^1/_4$ node eaten) or less.

[2] T-band & Furrow = granular insecticide applied at planting time;
B'cast-nc = liquid insecticide broadcasted during first 2 weeks of June, no cultivation;
SB = SmartBox application (all others are Noble application);
Furrow-M = microtube application, in-furrow.

[3] Crawfordsville test (4 replications), 2000; 0.81 node eaten in the CHECK.

[4] Six tests (27 replications), throughout IA, 2000; 1.68 nodes eaten in the CHECK.

[5] Fifteen tests (69 replications), throughout IA, 1998-2000; 1.72 nodes eaten in the CHECK.

[6] Means sharing a common letter do not differ significantly according to Ryan's Q Test ($P \leq 0.05$).