Rove Beetle Control Using Selected Insecticide Agents on Bentgrass Greens Turf

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Abstract

Rove beetles (Osorius planifrons) can and often do cause extensive surface disruption on turf mowed at greens height. Two rates (1x and 2x of product label rate) of Crusade (fonophos), Sevin (carbaryl), DeltaGard (deltamethrin), and Chipco Choice (fipronil), were applied on September 28, 2001 on an SR1020 creeping bentgrass green. Percent rove beetle control was nearly 100% for DeltaGard at 9, 15 and 32 days after treatment, regardless of rate. Crusade had nearly 100% control at either rate at 9 days after treatment, which decreased slightly to 90-93% control by 15 days after treatment. Deltamethrin maintained 95% and 98% control at the 1x and 2x rates respectively, at the close of the test (32 DAT). Crusade maintained 93% and 98% control at the 1x and 2x rates at 32 DAT. Chipco Choice had a maximum control of 24% at 7 DAT when applied at the 1x rate, and a maximum control of 57% at 32 DAT when applied at the 2x rate. Sevin provided low levels of control which peaked at 53% at the 1x rate at 9 DAT, which decreased immediately afterwards. Delta-Gard and Crusade provided excellent control levels of rove beetles on SR1020 bentgrass greens.

Introduction

Rove beetles are members of the insect order Coleoptera. They are predacious on other small insects and arthropods, but their presence on closely mowed golf course greens is often problematic. The continuous tunneling of this species often results in surface mounding which can cause (1) an immediate discontinuity in the turf (2) pocked turf from sun scald and heat injury from sand mounds, and (3) sand streaking from brushing, and bedknife smearing. Activity is minimal during the coldest months of late November, December and early January. Use of a fiberglass whip is only partially effective, since only part of the mound is removed. Rove beetles were reported as the number one insect pest in Arizona by Golf Course Superintendents (1995 survey). With this in mind, one older and three newer insecticides were evaluated at 1x and 2x product label rates for control/suppression of rove beetles.

Materials and Methods

A 3600 square foot green of SR1020 bentgrass was selected, due to high incidence of rove beetle mounding. Plots were 10'x5', replicated six times in a RCB design. One half of each plot received the insecticide treatment, while the other half remained untreated. This provided excellent estimates of background pressure, which also minimized plot-to-plot variance due to location.

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Treatments included the following: Sevin 4SL applied at 2.94 and 5.88 oz/product/1000 ft^2; Chipco Choice 0.1G applied at 12.5 and 25.0 lb/prod/acre; DeltaGard 0.1GC applied at 2.98 and 5.97 lb/prod/acre; and Crusade 5G applied at 0.92 and 1.84 lb/prod/1000 ft^2.
Treatments were applied on Sept 28, 2001. All granular treatments were applied to plots as hand topdressing after thoroughly incorporating the products into 2 quarts of sand. Sevin was applied using a 3 nozzle boom (8008 nozzles) using a $C0_2$ canister at 29 PSI. The volume delivery rate was 63 gallons per acre. Plots were evenly watered immediately afterwards with a hand held hose. The test site was mowed at 5/32", 6x week, with a walk behind 22" greens mower. Plots were irrigated to avoid moisture stress at 80% of the Reference ET value generated from a weather station 60 yards from the green.

The number of rove beetle mounds was counted on October 8, 14 and 31, which was 10, 16 and 33 days after treatment (DAT). Percent rove beetle control was calculated as 1-(treated counts/untreated counts) * 100. There were no statistical differences in the number of mounds among untreated half-plots at each evaluation date and F values for mound counts were usually less than 1.0. Therefore, no data transformation was required.

Mean separation was achieved by using Duncan's NMRT values when the "treatment" main effect was significant at the P=0.05 level or less. Orthogonal polynomial contrasts were used to measure the linear effect of dose rate among products, which proved significant for two products (see below).

Results

Natural infestation /insect pressure:
Rove beetle pressure was more than adequate during the conditions of the test. When analyzed alone, all control plots on each date were never significantly different from each other (as mentioned previously). On a per date basis, mean rove beetle mound counts among control plots ranged from 43 to 122 mounds per (5'X5') plot (Figure 1).

Response to application rates:
Linear dose application response for percent insect control occurred as follows: Chipco-Choice (fipronil) on October 31 (33 DAT) (17% and 57% control for 1x and 2x rates, respectively). Sevin was negatively linear for percent control on October 8 (10 DAT). More control was achieved at the lower 1x rate, than at the higher 2x application rate at that time for Sevin.

Percent Rove beetle control:
Percent insect control ranged from 11% to 99% on October 8; from –65% to 98% on October l4; and from 63 % to 99% on October 31 (Table 1, Figure 2).

The general product performance trends were as follows:
Sevin (carbaryl) is an older chemistry, which is labeled for select surface insect control, and was listed in older literature for earthworm suppression. Sevin produced low level and erratic control, with a higher level of control (on October 8) at the 1x application, than at the 2x application rate. Sevin had maximum control of 55% at the 1x application rate on October 8 (10 DAT). Rove beetle mounding actually increased on Seven treated plots on October14 (24 DAT), with higher mound densities than that of their respective controls. At the close of the test, Sevin provided only 6% and 12% control at the 1x and 2x label rates, respectively (Table 1, Figure 2).

Chipco Choice (fipronil). Chipco Choice was only slightly effective for the control of rove beetles. By October 14 (16 DAT), a maximum percent control of 30% was achieved for Chipco Choice at the 2x application rate. (Table 1, Figure 2). Only on the last date of the test was percent rove beetle control slightly over 50% control (at the 2x application rate, on October 27).

Crusade (fonophos). While deleted from the turf market, this product produced high levels of control, being just slightly less than that of Chipco Choice. Both rate treatments produced 90% to 99% control at 10 and 16 DAT. At the end of the test (Oct 31 /33 DAT) the 1x and 2x rates produced 93% and 98% control, respectively. (Table 1, Figure 2). Crusade demonstrated excellent control and very good residual effects. Whether a special local needs permits becomes a reality for fonophos in turf remains undetermined.

Delta Gard (deltamethrin) produced excellent rove beetle control, with very good to excellent residual effect. At 10 and 16 DAT (Oct. 8 and 14), percent insect control was 97-99% among both application rates. At the close of the test (Oct 31, 33 DAT) the 1x and 2x rates had 96% and 99% control, respectively. (Table 1, Figure 2). Hopefully, DeltaGard will have rove beetle control/suppression added to the label, or as a SLN (special local needs) permit.

Rove beetles (by observation) are cyclic in their presence as determined by mounting activity. Long term efficacy, timing and rate protocols should be completed for developing deliberate control program protocols for Rove beetle control.

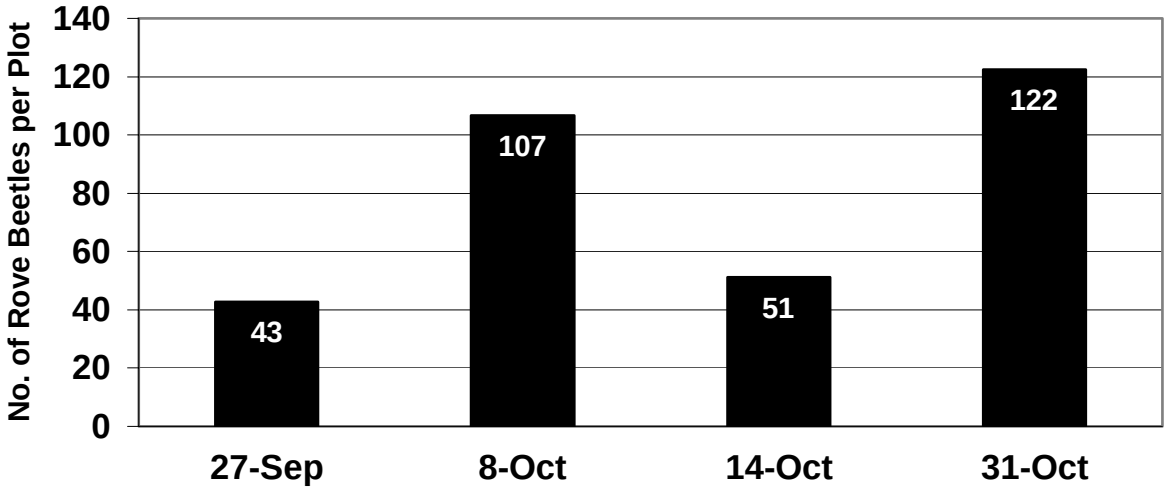
Table 1. Percent Control of Rove Beetles on a bentgrass (SR1020) putting green using select insecticides – Fall 2001. Karsten Research Facility, The University of Arizona.
Treatments applied September 28, 2001.

	8-Oct-01		*14-Oct-01*		*31-Oct-01*	
	10 DAT		*16 DAT*		*33 DAT*	
Treatment						
Chipco Choice 0.1 'fipronil' @ (0.0125 lb.ai/A) -or- 12.5 lb. prod./Acre	24.2%	bc	21.0%	ab	16.9%	c
Chipco Choice 0.1 'fipronil' @ (0.0250 lb.ai/A) -or- 25.0 lb. prod./Acre	17.0%	c	29.6%	ab	57.0%	b
DeltaGard 0.1 GC 'deltamethrin' @ (0.130 lb.ai/A) -or- 2.98 lb. prod./M	97.9%	a	98.0%	a	95.6%	a
DeltaGard 0.1 GC 'deltamethrin' @ (0.260 lb.ai/A) -or- 5.97 lb. prod./M	99.1%	a	97.1%	a	98.9%	a
Sevin SL 4# 'carbaryl' @ (4.0 lb ai/A) -or- 2.94 oz. prod./M	54.7%	b	-64.6%	b	6.3%	c
Sevin SL 4# 'carbaryl' @ (8.0 lb ai/A) -or- 5.88 oz. prod./M	10.8%	c	-50.3%	b	12.2%	c
Crusade 5G 'fonofos'@ (2.0 lb. ai/A) -or- 0.92 lb. prod./M	96.9%	a	90.8%	a	92.7%	a
Crusade 5G 'fonofos'@ (4.0 lb. ai/A) -or- 1.84 lb. prod./M	98.6%	a	93.5%	a	97.6%	a
test mean	62.4%		39.4%		59.7%	

Control expressed as percentage of non-treated controls. Values are the average of six (6) replications. Treatments whose average values are followed with identical letters are not significantly different from each other, DNMRT. Comparisons are between tretament means for each date (column).

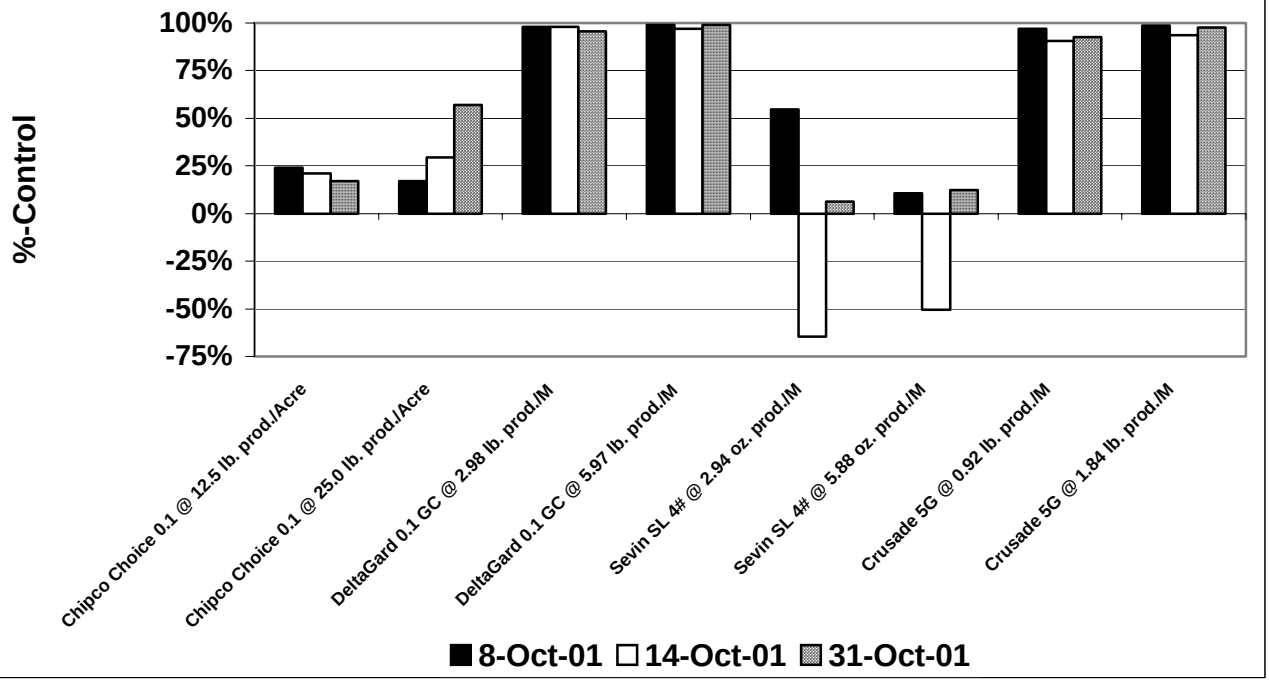
Test mean = average %-control of all treated plots on each evaluation date. N = 48.

Figure 1. Rove Beetle pressure in untreated plot halves (5'x5'). Values are number of individual mounds 48 hours after mowing. The University of Arizona, 2001.



- Sept. 27 average of all plots prior to treatment applications on Sept. 28th, 2001
- October 8th, 14th and 31st are non-treated half-plot investation levels at 9, 15 and 32 days after treatment.

Figure 2. Percent Rove beetle control on a bentgrass (SR1020) putting green after select insecticides were applied Sept 28, 2001. University of Arizona.



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