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PINE VOLE CONTROL IN 1979 FIELD PLOTS

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Abstract. Broadcast treatments of Volak (Brodifacoum) applied at rates of approx. 20 lbs/acre gave 98% control of voles when active ingredient levels were from 0.005% to 0.0005% in the bait. Of the two Rozol (Chlorophacinone) formulations tested, the French (Lipha) pelleted formulation appeared to be slightly better than what is currently being marketed in the USA. The Maki (Bromodialone) bait formulated in the same wax bait carrier as the Rozol-USA gave no better control than Rozol. Ramik-Brown (Diphacinone) did not appear to be as good as the other anticoagulants tested when applied either as a broadcast or as a hand placed bait.

Plastic place pack Volak gave excellent control of voles when placed under shingles, old tires split in half, or cinder blocks. A new pelleted Zinc Phosphide formulation from Bell Labs gave excellent control of pine voles when applied as a hand placed or broadcast bait. Zinc Phosphide oat and corn, surface-coated, grain formulations did not perform well. In a separate experiment a laquard wheat formulation of Chlorophacinone performed well as a hand placed bait at 10 lbs/A under shingles.

Introduction: Since the Environmental Protection Agency has been concerned with the potential non-target hazard of Brodifacoum for outdoor uses, a concentration range from 0.005% to 0.0005% was evaluated against pine voles to determine the efficacy of lower active ingredient formulations. In addition, since broadcast baiting for pine voles is rather new, Volak was compared within the same experiment to Rozol, Maki, Ramik-Brown, and two formulations of Zinc Phosphide (Zn_3P_2) on a uniform population. Also since little is known about the comparisons of the same formulations applied either as a hand placed or a broadcast bait, Ramik-Brown and two formulations of Zn_3P_2 were applied at orchard rates using both methods.

Methods and Materials: Evaluation of pine vole control plots was determined using methods previously described (1,2). In these experiments plots were blocked according to the pretreatment activity readings by first ranking plots from high to low and assigning treatments randomly into activity categories: high, medium, low. Data summarized in Table 1 and 2 was in an orchard having approx. 36 trees/A (35' X 35'). Data in Table 3 was designed to evaluate split rubber tires and concrete cinder blocks (2 X 8 X 16 inches) as a site cover for Volak plastic place packs.

Results and Discussion: Broadcast applications of Volak at reduced active ingredient levels from 50 ppm to 5 ppm gave excellent control of pine voles (Table 1). Presently, we believe a 10 ppm finished bait would be an adequate active ingredient level for pine voles. Without further knowledge about its acute characteristics at lower than the 10 ppm level, I believe this should be the level of the field bait. The Volak place pack with 2 packs/tree or about 70 per acre gave excellent control. However, those sites still active were of concern, since we know no animals were killed at these trees because the packets were not opened. No explanation can be given for why some packets were not opened. Laboratory data indicate that 5-10% of the packets also are not opened in singly caged pine vole trials. Better control was achieved with Rozol than Maki based on % activity. This would not be expected since Bromodialone is more toxic than Chlorophacinone (1).

The most significant finding in the 1979 test was the excellent control achieved by a 2% Pelleted Zinc Phosphide formulation made by Bell Labs, Inc. The data show that the formulation (FMC vs Bell Labs, Table 1) is more important than the method of application (hand placed vs broadcast). The Bell Labs formulation now has a federal label for voles in orchards. The label rates, however, are approx. 1/2 those rates used in these experiments. I am particularly concerned about the broadcast label rate being too low. I believe 10 lbs/acre is at the critical level for the number of pellets per unit area, and therefore, a 15-20 lb/acre rate should be used. The hand placed rate of 2-3 lbs may be sufficient, but more experiments will be required to determine this. The whole wheat Rozol formulation applied as a hand placed bait also gave excellent control of pine voles (Table 2).

The placement of plastic Volak packets under either sliced tires or cinder blocks (Table 3) gave excellent control. Place packs were opened very well over the summer period which gave some evidence that populations may have been quite high if packets had not been present. The % of trees infested in both plots in the fall of 1979 were rather low but some voles were still present. This may have been due to the % of packs unopened as discussed previously.

Literature Cited

1. Byers, R. E. 1978. Performance of Rodenticides for the Control of Pine Voles in Orchards. J. Amer. Soc. Hort. Sci. 103(1):65-69.

2. Byers, R. E. 1980. A Field Method for Evaluation of Rodenticides for Control of Microtus pinetorum in Apple Orchards. Vert. Pest. Control and Management Materials ASTM STP 680. J. R. Beck Ed. Amer. Soc. for Testing and Materials (in review).

Table 1. Field evaluation of broadcast and hand placed rodenticides for pine vole control in orchards treated November 14-15, 1979.

Treatment	Rate (kg/ha)	Rate (lbs/A)	% Activity[y] Nov. 9	% Activity[y] Nov. 30	Voles/plot (Dec. 3-7)	Voles/site (Dec. 3-7)	% Control
1. Control	--	--	89 a[z]	87 a	31.7 a	1.25 a	--
2. Volak[w] -- 0.005% BFC	21	19	88 a	15 def	0.7 d	0.03 d	98
3. Volak[w] -- 0.0025% BFC	20	18	85 a	6 ef	0.3 d	0.01 d	99
4. Volak[w] -- 0.001% BFC	19	17	88 a	5 ef	0.7 d	0.02 d	98
5. Volak[w] -- 0.0005% BFC	29	26	85 a	5 ef	0.3 d	0.02 d	98
6. Volak[x] -- packet 0.005% BFC	8	7	87 a	4 ef	1.0 d	0.03 d	98
7. Rozol[w] -- 0.005% CPN (Lipha)	25	22	88 a	0 f	0.3 d	0.01 d	99
8. Rozol[w] -- 0.005% CPN (USA)	24	21	88 a	33 bcd	2.7 d	0.11 d	91
9. Maki[w] -- 0.005% BDL	22	20	87 a	44 bcd	4.7 cd	0.19 cd	85
10. Ramik[w] -- 0.005% DPN	24	21	84 a	51 bc	6.0 cd	0.24 bcd	81
11. Ramik[x] -- 0.005% DPN	11	10	85 a	40 bcd	10.7 bc	0.41 bc	67
12. ZnP[w] -- 2% Corn + Oats[u]	21	19	85 a	67 ab	14.0 b	0.49 b	61
13. ZnP[x] -- 2% Corn + Oats[u]	6	5	85 a	59 abc	11.0 bc	0.42 bc	66
14. ZnP[w] -- 2% Pellet[v]	28	25	89 a	29 cde	2.7 d	0.10 d	92
15. ZnP[x] -- 2% Pellet[v]	6	5	89 a	19 def	1.7 d	0.07 d	94

[u]Commercially available Corn and Oat formulation from FMC.

[v]Pelleted formulation from Bell Labs.

[w]Treatment was broadcast in a band under tree limbs.

[x]Treatment was hand placed at two locations under shingles at each tree.

[y]Apples placed in 2 holes or runs 5 - 15 cm below the soil surface on opposite sides of the tree trunk were examined 24 hours after placement. Percent activity refers to all sites with vole tooth marks on the apple.

[z]Mean separation, within columns by Duncan's multiple range test, 5%. Three replicate plots per treatment.

Table 2. Effect of hand placed Rozol (CPN) bait on pine vole activity and populations treated November 28, 1979.

Treatment	Rate		% Activity[y]		Voles/plot	Voles/site	% Control
	kg/ha	lbs/A	Nov 28	Dec 13			
Control	--	--	81 a[z]	74 a	22.0	0.97	--
Rozol -- 0.005% CPN - wheat grain	11	10	84 a	18 b	0.5	.02	98

[y] Apples placed in 2 holes or runs 5-15 cm below the soil surface on opposite sides of the tree trunk were examined 24 hours after placement. Percent activity refers to all sites with vole tooth marks on the apple.

[z] Mean separation, within columns by Duncan's multiple range test, 5%. Three replicate plots per treatment.

Table 3. Effect of bait station type on pine vole activity and plastic packet opening of Volak place packs (1979).

Treatment[x]	% Activity				
	April 3	May 11	Oct 30	Nov 28	May 8
1. Rubber tires	65 a[y]	11 a	22 a	16 a	22 a
2. Cinder blocks	65 a	1 a	13 a	6 b	17 a
	% Plastic packs open				
1. Rubber tires		38 b	98 a	16 a	34 a
2. Cinder blocks		66 a	70 b	15 a	20 a

[x] Packets were placed under both tires (sliced in half) or cinder blocks on April 3, May 11, October 30, November 28, May 8.

[y] Mean separation, within columns by Duncan's multiple range test 5%. Three replicate plots/treatment. One site treated per tree. Over 45 sites per plot.