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PINE VOLE CONTROL WITH HERBICIDES

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The pine vole, M. pinetorum, has become the number one problem in many West Virginia orchards. It's deep subterranean tunnel system makes it more difficult to control than other voles. A decade ago the vole population was limited almost entirely to the apple orchard. This undoubtedly correlates to the abundance of vegetative ground cover found in the apple orchard as contrasted to the more cleanly cultivated peach orchard. The cultural methods used in the peach orchard have changed toward a sod culture similar to that of the apple orchard and at the same time the vole problem in the peach orchard has increased.

During the years of a herbicide experiment which was started in the early life of the orchard, it was observed that tree injury by the vole was greatly reduced or not present in herbicide treated plots as compared to non-herbicide treated areas. This orchard used in a pine vole monitoring experiment by Dr. R. E. Byers was part of Walnut Hill Orchard, Charles Town, W. Va. It consisted of Golden Delicious and Winesap planted alternately 15 feet by 30 feet in 1962 on an old orchard site. During the first two years of the orchards life, the entire area was cultivated. The ground cover contained mostly broadleaf weeds, predominately poison ivy and horsenettle, and a few summer grasses. The herbicide experiment consisting of four tree herbicide treated plots and four tree mulched plots each with five replications was established in April, 1964. The residual herbicide simazine at the rate of 4.0 lb. ai/A has been applied each spring from 1964 to the present time. Amitrole at 1.0 lb. or 2.0 lb. ai/A was applied with the simazine during the years of 1964 to and including 1971. Starting in 1972, paraquat at 0.5 lb. ai/A has replaced amitrole for use with simazine. All of the applications have been applied near the time of bloom. The herbicide applications have covered a band of no less than 2.5 feet wide on each side of the trees in the early life of the experiment. As the limb spread of the tree became greater, the treated width was increased to the present six foot band on each side of the trees. The non-herbicide treated plots were mowed and very lightly mulched with material that could be acquired from the limited vegetation in the mowed row middles during the years 1964 and 1967. Subsequent years only mowing has been practiced for the non-herbicide treated plots. Voles were evident under the meager mulch during the winter of 1964 - 1965. As more grass and broadleaf vegetation became permanently established in the non-herbicide plots, a one-foot area around the tree trunk was treated with a herbicide to reduce possible vole girdling of the tree.

In November 1973 following the tenth growing season of the experiment, Dr. Ross Byers, VPI & SU, monitored the vole activity in the herbicide treated plots and the non-herbicide mowed plots. The follow-

ing table is a summarization of the activity as reported in Hort Science (1974, Vol. 9:445-446).

Treatment	Total number of trees	No. sites found[z] per tree Tree number in each replicate 1	2	3	4	Average
Control	14	2.0	2.0	2.0	1.75	1.96
Simazine[x] (4 lbs/A)	15	.75	0.0	0.0	.75	.40
		No. of active sites[y] per tree				
Control	14	1.0	1.75	1.5	1.75	1.50
Simazine[x] (4 lbs/A)	15	.25	0.0	0.0	.25	.13
		No. of voles caught per tree				
Control	14	1.5	1.5	1.5	2.0	1.64
Simazine[x] (4 lbs/A)	15	.5	0.0	0.0	.25	.20

[z] A site refers to a vole run or hole below the soil level which appears to be active. A limit of two sites per tree was imposed.

[y] All sites having characteristic vole tooth marks on an apple placed in a run or hole approximately 24 hours previous.

[x] Simazine was applied annually for ten years to four replicates of 4 trees each in a tree row width band presently 4 meters wide. All vole activity and catches were made at tree numbers 1 and 4 which were directly adjacent to the untreated control areas in the same row. Trees in position No. 1 and 4 acted as buffers for trees 2 and 3.

This certainly indicates the great possibility of good pine vole control where a wide enough herbicide band is utilized from the inception of the orchard. The herbicide should be effective throughout the entire growing season.

An experiment cooperating with Dr. Ross Byers was initiated in 1974 at the West Virginia University Experiment Farm, Kearneysville, W. Va. The orchard planted in 1951 at a 20 by 20 foot distance has had a very high pine vole population for several years. A cultural experiment was designed to control the pine vole without the use of toxicants. Replicated treatments consisted of cultivation with Smitty Tree Hoe in July and November, (2) cultivation with Smitty Tree Hoe in November, (3) herbicide with 4.0 lb. ai/A simazine, 5.0 lb. ai/A dalapon and 2.0 lb. ai/A 2,4-D applied in July, (4) cultivation with 2.0 lb. ai/A simazine in July and November and (5) mowing. It was immediately observed that for some treatments vole activity was markedly reduced but after several weeks only slight alteration of the pine vole habits were noticed for the various treatments. Possibly after several years of continuous cultivation, herbicide or cultivation with herbicide, control

of the pine vole might occur. All that seems to have been accomplished was to shift the surface trail system out into the row middles. The utilization of toxicant baits to the various culture systems add a very effective measure for the control of pine vole. Much efficient labor and time is required for this method of control.