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An Experimental Comparison of Vole Control Methods

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AN EXPERIMENTAL COMPARISON OF VOLE CONTROL METHODS

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This is a description of a new relatively long-term study of pine vole control under the North Carolina Agricultural Experiment Station. The objective is to evaluate on an experimental basis, the principal methods used to control vole populations and damage in apple orchards.

THE PROBLEM: Usually, practical control measures to reduce damage by pine voles have been limited to use of rodenticides, applied either in bait form or as a ground spray. On the other hand, some workers have maintained that removing the surface vegetation by cultivation and use of herbicides can provide either complete protection, or a general reduction in level of hazard. Such claims have been supported by observational studies. Control of voles by habitat manipulation would have certain advantages over the use of rodenticides; it would be environmentally more acceptable, reduce for the orchard worker the dangers in application of poisons for vole control, and possibly be less costly. We feel that there is need for a formal test on a relatively long-term basis, to explore how effective the practice of habitat manipulation may be in reducing vole damage and population levels.

THE EXPERIMENTAL PIAN: This experiment compares methods of reducing damage by voles either by use of rodenticides, or by habitat alterations, or by a combination of the two, through use of a randomized block design.

The field study areas, or blocks, are eight orchards in Henderson County, North Carolina. Each block contains four plots of approximately 2.5 acres each selected to be as nearly comparable as possible within that orchard. Data are recorded on a central area of about 0.9 acres. The remaining area outside of this central portion is a boundary or buffer zone that receives the same treatment. In most of the plots the trees range in age 8-18 years, and were planted at about 120 trees per acre. Figure 1 shows an idealized plot layout.

Within any one block, the four plots were randomly assigned treatments at the beginning of the experiment. The four treatments are grower option, rodenticide only, clean culture only, and combination of rodenticide and clean culture. Treatments are to be repeated over a number of years on the originally assigned plot.

The grower plot will serve as the closest thing to a control; whatever the grower does or does not do will be recorded as the treatment.

The rodenticide plot will receive a routine fall application of a rodenticide considered currently to be most desirable. We may be working with more than one rodenticide at a time but will use only one in any given plot.

The clean culture plot is to be maintained with clean ground under the trees, using cultivation and herbicides. Mowing will be done as we feel it is needed and standard herbicide applications will be made. We are not testing new herbicides.

The combination plot is under clean culture with rodenticides used here only when inspection shows that they are needed.

The equipment and materials used in field treatments are those used by growers. This equipment includes tractor, sprayers, sickle bar, bush hog and hedging blades such as are part of most orchard operations. Our records of time, materials and equipment used will provide cost figures for the treatments; we recognize this measurement of cost as important.

Results will be measured several ways. The number of damaged trees would be the most convincing variable in terms of usefulness of the treatment but we doubt that we have enough trees in our plots to distinguish any moderate difference between treatments as to the rate of tree damage and death. Vole activity, recorded both by probing for runways and by using the apple sign test, is being measured routinely at least three timings per year, in early fall, winter and summer. Vegetational cover is being measured once a year in mid-August as percent cover of grass, forbes and vines and as mean height under the trees and in the middles.

Analysis of the vole population by live-trapping, mark, and recapture is being undertaken at least twice per year, before and after the normal time for applying rodenticides in the fall. We are still considering two possibilities as to exact method. In the past we have used live-trapping in a grid pattern to determine survival rates but this method does not provide population estimates; at worst that method can be used. Second, however, we are currently developing a method for estimating population density as well as survival; this will be the method of choice if it provides sufficient information. In this second method the traps are set in cross lines (see Fig. 1) with trap numbers greatly reduced. As a result we will have a lower number of animals caught as compared to the grid method applied to the same plot. Breeding status and age will be recorded each time an animal is trapped.

Grower cooperation is essential to this type of investigation and we are fortunate in having good working relationships. Our association with the grower must remain voluntary on both sides; in two (rodenticide only and clean culture only) of the four plots in a block the grower has yielded to us, to a fractional degree, temporary control of his land, but clearly we cannot expect him to maintain this relationship contrary to his better judgement. On the other two plots, either the grower retains complete control, or the treatment (combination plot) applied is the best possible and its use is beneficial to him.

Although this study has a high manpower requirement, we are continuing to work with our IPOMS group on a study of integrated management of orchards.

As opportunity arises and time permits, we will continue with short-term field and laboratory tests on a one-treatment basis to answer practical questions about methods of application for labeled materials and provide ratings of efficacy for new materials as they are developed.

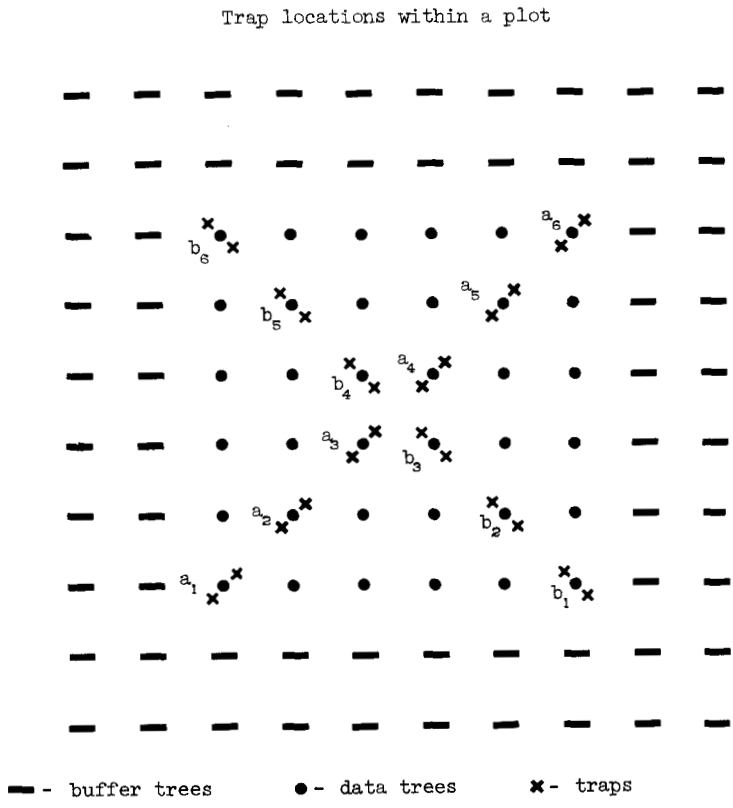

Fig. 1. Generalized view of a single plot, showing central trees where data are recorded, and buffer trees; treatments are applied over both the central data zone and the buffer zone.