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# APPLE PRODUCTION, VOLE CONTROL, AND WILD TURKEYS: FINDING A BALANCE IN VERMONT

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**ABSTRACT::** Meadow voles '*crotus pennsylvanicus*~ and pine voles '*crotus inetorum* cause extensive damage to apple trees by gnawing and girdling trunk and root systems. In 1991, approximately 70% of Vermont's 90 commercial apple producers were using zinc phosphide (ZP) treated cracked corn to manage vole damage. From November 1991 th'ought January 1992, 36 confined wild turkey elea `s allo avo deaths were attributed to the broadcast application of ZP treated cracked coin in Vermont orchards. As a result of public concern regarding impacts to nontarget wild turkeys, a working group was formed with representation of various state and federal agencies as well as the apple industry to address this issue and review current vole damage management strategies. Since 1992, statewide voluntary compliance with working group recammendations that included shifting to ZP treated rolled oats have reduced the risk of wild turkey exposure to ZP. In this paper we discuss the effectiveness of the working group recommendations as measured by a mail survey of apple producers as well as a preliminary 4-year analysis of statewide rodenticide sales.

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## BACKGROUND

Voles have a negative economic impact on the apple industry throughout the United States (Pearson and Forshey 1978, Askham 1988). In the eastern United States meadow and pine voles cause damage by gnawing on the bark of trunks and roots of apple trees (Pearce 1947). Small numbers of voles can inflict substantial damage to apple trees, thus the economic threshold for damage can be exceeded at low population levels (Richmond et al. 1987; Byers 1984). The loss of productivity, tree replacement costs, increased time for new plantings to come into production, as well as the cost of controlling vole damage, can be substantial (Tobin and Richmond 1987).

Orchards are likely to experience vole damage annually in the absence of vole damage management (Byers 1985). Management options include cultural *methods such* as mowing, vegetation free zones around trees, mouse guards

and toxicants such as zinc phosphide (ZP) or anticoagulants (Byers 1985).

Vermont has more than 90 commercial apple growers cultivating some 4,300 acres that contribute more than 14 million dollars annually to # statewide economy (L. Berkett~ UVM Ext. Serv., Pers. commun.). The size of the orchards are variable, but most average 30-70 acres in production, with only a few larger than 150 acres.

Turkeys were extirpated from Vermont in the mid-1800's, but in 1969, the State Fish and Wildlife Department began a reintroduction program (Blodgett 1995). As a result of the success of that program, Vermont currently supports a wild turkey population estimated to exceed 15,000 birds. The turkey is again a visible, highly valued upland game bird in Vermont with a state annual harvest of about 1,500 turkeys. The wild turkey is at the northern edge of its range in Vermont and as a consequence they rely heavily on waste corn left in fields after harvest and in manure spread on **fields**

during the fall and winter (Blodgett 1995). This food habit probably makes turkeys in Vermont more susceptible to feeding on ZP-treated corn baits distributed in apple orchards.

In 1991 and 1992, Vermont experienced an increase in wild turkey mortality associated with broadcast application of 2% ZP-treated cracked corn (EPA Reg. No. 2395-185) by apple producers. These were legal applications made with unfortunate results. From November 1991 through January 1992, 36 turkey deaths were attributed to ZP poisoning by the Vermont Department of Agriculture, Food and Markets laboratory in Waterbury, Vermont. The conventional wisdom holds that ZP remains "hot" for a relatively short period of time usually until it is exposed to moisture. In this case ZP-treated corn was remaining lethal for turkeys for more than 2 months postapplication. At this time, approximately 70% of Vermont orchardists were using ZP-treated cracked corn (Chipman 1993).

The purpose of this paper is to present a case history of a process implemented in Vermont to reduce the risk of ZP poisoning in wild turkeys as a result of vole damage management in apple orchards. We present an overview of an interdisciplinary working group, its recommendations and a follow-up analysis of voluntary compliance with these recommendations by producers.

## **Working Group**

To address growing public concern over the loss of wild turkeys, the Vermont Department of Agriculture, Food and Markets and the Vermont Fish and Wildlife Department formed an interdisciplinary working group. This group consisted of representatives from the Vermont Department of Agriculture, Food and Markets, the Vermont Fish and Wildlife Department, USDA, APHIS, Animal Damage Control, the University of Vermont Extension System, and 3 apple producers with widely divergent operations.

The goal of the working group was to develop recommendations that would reduce nontarget losses while still achieving adequate vole damage management in orchards. Four assumptions provided the basis for discussion and subsequent

recommendations, including: 1) vole management is an essential component of apple production; 2) toxic baits are a necessary component of a successful control program, making it critical to maintain the availability of tools like ZP; 3) the recommendations should account for a wide variety of perspectives associated with apple production and wildlife management; and 4) the recommendations should be presented in the context of integrated pest management.

The working group developed the following 5 basic recommendations which were publicized through seminars, pamphlets, word-of-mouth and an apple producer newsletter disseminated by the Extension System.

### **1. Intensify cultural practices**

We recommended that producers increase use of cultural methods such as mowing, herbicide strips and mouse guards to decrease the need for toxicants.

### **2. Monitor vole and turkey activity**

Tobin et. al. (1992) found that the apple slice index (asi) is the most effective way to monitor vole activity. We recommended that producers use asi or a snap trap index to determine the presence of voles and the need for control measures. In addition, producers need to become more aware of behavior and movement patterns of wild turkeys in orchards and to modify vole management activities accordingly.

### **3. Increase the use of bait stations**

Polyvinyl chloride (PVC) bait stations have been used successfully to control meadow and pine vole damage in apple orchards (Tobin and Richmond, 1987). Bait stations enhance vole management by protecting rodenticides from moisture as well as decreasing the risk of exposure to nontarget species.

### **4. Use ZP treated corn only in bait stations**

If producers use corn bait, we strongly recommended that they use some form of bait station.

### **5. Use alternative baits**

We recommended steam rolled oats as the best available bait alternative to cracked corn. However, we currently think using crimped or groat oats would result in even further reduction in risks to turkeys. In some states oats are an important

component of the wild turkey diet (Craven 1989, Wright et al. 1989). However, we speculate that because oats are grown on limited acreage in Vermont, and based on its size and color, it is less likely that turkeys would have a search image for this type of treated grain.

## **METHODS**

In the spring of 1995, ADC collaborated with the University of Vermont Extension System to survey apple producers in Vermont to preliminarily characterize voluntary compliance with the working group recommendations. We recognized the shortcomings of this type of survey and that Vermont producers are frequently asked to respond to surveys; however, we felt that some baseline information would be valuable to help farm and wildlife managers determine the direction of vole and turkey management in the future.

### **Sample**

Surveys were sent to 121 apple producers throughout Vermont. The survey contained 15 questions related to vole damage management activities from 1991-1994. A reminder postcard was sent out one week after the initial request. We did not survey non-respondents.

## **RESULTS**

A total of 56 usable surveys was received. The surveys were responded to by many of our commercial growers, including our largest producers. Although we did not sample non-respondents, we feel the survey characterized to a large degree vole damage management activities in Vermont.

About half of the respondents reported vole damage in any given year. The survey was not sensitive enough to document intensity of cultural practices, but the percentage of respondents using any single management practice did not change significantly over the four year survey period. All respondents indicated that they used at least one of the following cultural methods: mowing (100%), mouse guards (90%), removing fruit drops (52%), and herbicide strips (38%).

Surprisingly, only 53% of respondents indicating using toxicant to control voles. However, those using ZP indicated they used less corn and a greater amount of oats from 1991-1994 (Fig. 1). The majority of respondents indicated that oats were successful in controlling voles.

### **Rodenticide Sales**

To further evaluate ZP formulation use in Vermont and recognizing that our survey had some inherent weaknesses, we compared our survey data with pesticide sales by a company that sells the majority of ZP bait in the state. As a percent of overall bait sold, corn decreased and oats increased from 1991-1994 (Fig.2). However, there was an overall increase in rodenticide sold, and the amount of corn bait sold in 1991 and 1994 was similar.

## **DISCUSSION AND MANAGEMENT IMPLICATIONS**

Statewide voluntary compliance with the working group recommendations have reduced the risk of poisoning wild turkeys. No wild turkey mortalities associated with ZP have been reported since 1992. The results of the survey and analysis of rodenticide use over a 4-year period in Vermont suggests that the working group recommendations represent a comprehensive, integrated approach to better meet the varying perspectives on wildlife damage management in Vermont apple orchards. Five basic management implications are: 1) Turkeys eat ZP treated corn in Vermont, and the broadcast baiting of this formulation increases the risk of poisoning turkeys. 2) Our observations suggest that the ZP corn formulation used in Vermont remains "hot" for turkeys for more than 2 months. 3) A ZP oat formulation appears to be an effective alternative to corn as a bait carrier and reduces the risk to turkeys. 4) Based on recent increases in ZP corn use, it is clear that we need to continue to discuss nontarget issues with Vermont apple producers. 5) We need to find better ways to monitor vole management practices in Vermont and study the efficacy of various ZP oat formulations for reducing risks to turkeys while providing adequate vole control.

## SUMMARY

There has been a general increase in awareness on the part of producers, government agencies and the public regarding the potential impact of vole damage management in apple orchards on wild turkeys. Our preliminary findings indicate a conversion to ZP-treated oat bait among Vermont apple producers. We attribute this positive step to the effectiveness of the working group approach in developing practical options for all concerned stakeholders

We feel that this case study demonstrates that a working group can be used effectively to negotiate solutions to complex wildlife damage problems. Based on survey data and anecdotal information, risks to nontarget wild turkeys have been reduced while maintaining adequate vole management in Vermont. Vole damage management in apple orchards can go hand in hand with the sound stewardship of the land. We believe continued statewide voluntary compliance with these recommendations will further reduce impacts to wild turkeys and possibly other nontarget species.

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