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THE VOLE PROBLEM IN PENNSYLVANIA APPLE ORCHARDS

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Fruit crops are an important agricultural industry in Pennsylvania. According to the 1972 Penn. Orchard and Vineyard Survey compiled by the Penn. Department of Agriculture the industry encompasses over 60,000 acres as listed below:

<u>Crop</u>	<u>Number of Growers</u>	<u>Acres</u>
Apples	715	34,601
Pears	401	1,212
Peaches	545	11,076
Nectarines	130	253
Tart Cherries	318	2,613
Sweet Cherries	232	618
Plums & Prunes	281	528
Grapes	379	9,888
All Fruits	1,035	60,780

Current Magnitude of the Problem: At the present time voles are the single most destructive pest in apple orchards in Penn. No other pest can inflict the type of damage that can kill apple trees as surely as girdling. Orchardng involves tremendous investments (\$2,000 - \$3,000 per acre) and these investments are being seriously threatened by localized outbreaks of pine and meadow vole infestations.

Control Methods Available: At the present time The Pennsylvania State University, Cooperative Extension Service, recommends that several methods be used to aid in the control of vole populations below the economic injury level. This involves the integrated pest management concept commonly used for insect, mite and disease control. Cultural methods, combined with the proper applications of rodenticides usually will give protection to trees. The following methods are suggested:

1. Physical Barriers
 - a. Mouse guards of 3/8th inch mesh wire cloth 18 inches tall are suggested.
 - b. The use of crushed stone or gravel 3-4 inches deep extending 15-18 inches from the trunk is recommended.
2. Weed-Free Area Around Tree Trunks
 - a. Herbicides can be used to keep a square area weed-free (4 x 4 ft up to 10 x 10 ft) around each trunk or a continuous strip (3-6 ft wide) can be maintained weed-free in the higher density plantings.

- b. Cultivation can be used to maintain the same size weed-free area.
3. Orchard Mowing
It is suggested that the sod in orchards be maintained between 3 and 6 inches in height.

4. Rodenticides

At the present time the use of rodenticides is recommended in those orchards where control measures 1 through 3 above do not appear to be providing adequate protection: The following materials are recommended by The Pennsylvania State University to control pine or meadow voles as specified on the labels.

- a. zinc phosphide (62-63%) - To make baits
b. zinc phosphide (0.92-2.0%) - Prepared baits
c. chlorophacinone (0.005%) - Prepared bait
d. chlorophacinone (5.34%) - Ground spray
e. diphacinone (0.005%) - Prepared bait

The following rodenticides may be legally used in Pennsylvania but their use is not recommended by the Cooperative Extension Service of The Pennsylvania State University:

- f. Endrin - Ground spray
g. Strychnine - To make baits

Seriousness of the Current Situation: The seriousness of the current situation I believe can best be judged by estimates of the current use of rodenticides to aid in the control of voles in apple orchards. Informal estimates of the percentage of apple orchards that are treated in Pennsylvania range from 66 to 80%. Applying these percentages to the actual number of acres of apple orchards in Penn. results in estimates of the treated acres ranging from 22,840 to 27,680. Listed below are estimates of the use of the most common rodenticides used in Penn. apple orchards:

<u>Material</u>	<u>Estimated Use</u>	<u>Estimated Range in Acres Treated</u>
Endrin	50-60%	11,420 - 16,610
zinc phosphide	35-45%	7,995 - 12,460
other	5%	1,140 - 1,380

It appears that the present systems of cultural practices in use in Penn. apple orchards provide a rather favorable environment for voles. The estimated widespread use of rodenticides to aid in the control of these pests would substantiate these beliefs.

Future Projections: It would appear that more research is needed in several areas. Basic information on vole biology might allow the orchardist to modify his cultural practices to prevent or retard large population increases. However, until such information is available and its usefulness has been documented, it would appear that effective rodenticides are absolutely essential for the profitable production of healthful, satisfying apples.

Research is needed to maintain an arsenal of safe, effective rodenticides for use in apple orchards.

Regulatory, research and extension personnel should all be working for the protection of the environment while at the same time protecting the apple industry and the food supply of this country.