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SOME PINE VOLE MOVEMENT PATTERNS IN SEVERAL APPLE ORCHARDS IN HENDERSON COUNTY, NORTH CAROLINA

by

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INTRODUCTION

In controlling pine voles in orchards a question often comes up about the distance the voles will move from outside into an orchard where the resident animals have been removed by a control program. There are several possible ways to study this, but at present the closest we can come to an answer is to see how far animals move in live-trapping studies.

Naturalists have raised many questions about how to interpret these observations of trapped animals. For example, maybe movements are farther or more frequent <u>into</u> areas which have no resident animals or perhaps the animals that move in are wandering, looking for living space and not nearby residents. The live-trappings studies reported here tell us nothing about these questions.

In this study I will summarize movements according to how frequently the animal moved between rows. I have not tried to average these movements or do any kind of statistical study because there are so many unknown and disputed questions in the interpretation of home range.

METHODS

The records of movement of pine voles in orchards that I am reporting here come from live-trap, mark and release experiments in the

Table 1. Areas trapped, total number of animals captured and percent ground cover in the experimental orchards in which vole movements were recorded

	Orchard Identification Number							
	1	2	3	4	5	17	23	
Area under traps, acres	1.24	1.19	2.06	2.64	1.12	2.70	0.34	
Rows of traps	10	10	10	10	4	7	4	
Distance between rows, feet	28.4	28.4	28.9	36.0	30.0	29.8	30.7	
Distance, traps in row, feet	197	196	306	302	448	252	158	
Animals captured:								mean
adult males	25	26	15	16	8	41	21	21.7
adult females	23	27	19	17	4	49	18	22.4
juveniles, both sexes	40	38	17	11	11	23	13	21.9
Total	88	91	51	44	23	113	52	66.0
Vegetation in rows								
grass	35	35	70	70	80	80	98	
forbes	15	15	30	5	10	15	1	
vines	50	50	0	5	5	3	1	
bare ground	0	0	0	20	5	2	0	
Vegetation in middles								
grass	50	50	75	90	90	95	80	
forbes	35	35	20	10	10	5	20	
vines	15	15	0	0	0	0	0	
bare ground	0	0	5	0	0	0	0	

effectiveness of rodenticides. These records come from 7 orchards in Henderson County, N. C. where trap grids were set with traps in a regular pattern in several rows of trees. Other studies where incomplete grids were set are not summarized here.

Trapping was with Sherman live traps (3 x 3 x 10 inches; galvanized sheet steel) set under cover of a piece of composition roofing, often in a shallow trench dug to place the trap at the level of the burrow. Traps were tended twice daily. Each animal was marked by toe clip with a unique serial number and released where caught. Some individuals were caught as many as 20 times in a 43 day period.

Studies were conducted as 4 or 5 trapping periods of about 5 days each with intervals of several days when traps were closed. Distances

Table 2. Movement of adult male pine voles summarized to show the number moving over the stated span of rows, and maximum and minimum distances moved in the same row

		Orchard Identification Number							
		1	2	3	4	5	17	23	Total
Span of rows:									
1.	no. animals	1	1	3	5	3	11	9	33
	min. dist.	--	--	0	0	0	0	0	0
	max. dist.	74	56	28	34	30	141	25	141
2.	no. animals	4	2	3	2	0	2	0	13
	min. dist.	19	56	0	34		16		0
	max. dist.	74	74	28	204		141		204
3.	no. animals		1	2	1	0	0	0	4
	min. dist.		--	0	--				0
	max. dist.		56	140	34				140
4.	no. animals		3	0			1	0	4
	min. dist.		19		0	0			0
	max. dist.		56				173		173
5+	no. animals		1(7r)	0	1(5r)	0	0	0	2
	min. dist.		--		--				68
	max. dist.		112		68				112
Total number		5	8	8	9	3	14	9	56
Percent in more than one row		80	88	62	44	0	21	0	41

moved over the entire study are reported here.

Table 1 shows some of the characteristics of these 7 studies. The distance between tree rows were very close to 30 feet in all but one orchard. The percent composition of ground cover is shown both for vegetation in rows and for that between rows.

In total, 462 animals were captured in these 7 studies. On the average, about 22 were caught in each orchard of adult males, of adult females, and of juveniles of both sexes (Table 1). Many of these records could not be used in summarizing information on movement. Records of all animals dying or removed for study were discarded as were records of animals only caught once. Further, records of animals caught only in the edge traps of a grid were excluded on the basis that they probably lived mostly outside the grid being studied. Captures of the remaining 163 animals were plotted to scale on graph paper, and the results were summarized in Tables 2, 3, and 4. I am grateful to B. Chapman and D. Davis for making the plots.

Table 3. Movement of adult female pine voles summarized to show the number moving over the stated span of rows, and maximum and minimum distances moved in the same row

	Orchard Identification Number							
	1	2	3	4	5	17	23	Total
Span of rows:								
1. no. animals	3	4	8	6	1	13	4	39
min. dist.	0	19	0	0	--	0	0	0
max. dist.	56	93	56	68	30	110	25	110
2. no. animals	2	1	3	2	0	10	2	20
min. dist.	19	--	28	68		16	0	0
max. dist.	167	112	28	170		220	100	170
3. no. animals	0	1	0	0	0	0	0	1
min. dist.		--						--
max. dist.		74						74
4. no. animals	0	1	0	1	0	0	0	2
min. dist.		--		--				68
max. dist.		112		68				112
5+ no. animals	0		0	1(6r)	0	0	0	1
min. dist.				--				--
max. dist.				170				170
Total number	5	7	11	10	1	23	6	63
Percent in more than one row	40	43	27	40	0	44	33	38

RESULTS

Results are shown in three tables. Table 2 presents results for adult males, Table 3 for adult females, and Table 4 for juvenile animals of either sex. Each table shows for each study orchard the number of animals with movement recorded only in one row, in two rows, over a 3-row span whether or not taken in the row between, over a 4-row span, and over a span of 5-rows or more (with number of rows indicated for each animal in this last group). The percent caught in more than one row is shown.

Figure 1 shows an apparent relation between percent caught in more than one row, and the percent of grass in the orchard cover (average for that in rows and in middles as shown in Table 1).

DISCUSSION

Off hand, there do not seem to be any clear differences in results by sex or age of the animal. Over all the orchards reported, an average of about 40 percent of the animals were captured in more than one row, and 13 percent in more than 2 rows. It is hard to understand the

Table 4. Movement of juvenile pine voles of both sexes summarized to show the number moving over the stated span of rows, and maximum and minimum distances moved in the same row

		Orchard Identification Number							
		1	2	3	4	5	17	23	Total
Span of rows:									
1.	no. animals	3	5	1	6	4	6	2	27
	min. dist.	0	0	--	0	0	0	0	
	max. dist.	37	37	0	68	30	63	75	
2.	no. animals	4	2	2	0	0	2	0	10
	min. dist.	19	93	0			16		
	max. dist.	130	112	84			126		
3.	no. animals	0	2	0	0	0	1	0	3
	min. dist.		93				16		
	max. dist.		93				60		
4.	no. animals	2	0	0	1	0	1	0	4
	min. dist.	19			--		89		
	max. dist.	186			68		157		
5+	no. animals	0	0	0	0	0	0	0	0
	min. dist.								
	max. dist.								
Total number		9	9	3	7	4	10	2	44
Percent in more than one row		67	44	67	14	0	40	0	39

apparent relationship shown in Figure 1 which implies that the less the percent of grass in the orchard cover, the more animals moved out of a single row. This trend depends on results from two similar orchards where the sex-age classes behaved somewhat alike.

Movement in the row seems to be greater than movement between rows, to judge from the maximum distances recorded. A number of maximum moves of 120 feet or more are recorded in the rows; if such moves were across rows the distance would be about 4 rows. The range of movement in the row seems to be about the same regardless of how many rows the animals move across, with possibly a lesser range for those not moving out of one row.

From this work it seemed that a clean border strip equal to one distance between rows of trees means that some animals living in the fence row usually come into the first row of trees. Treating the fence row should reach many of the resident animals which might otherwise move into the orchard immediately after a control program.

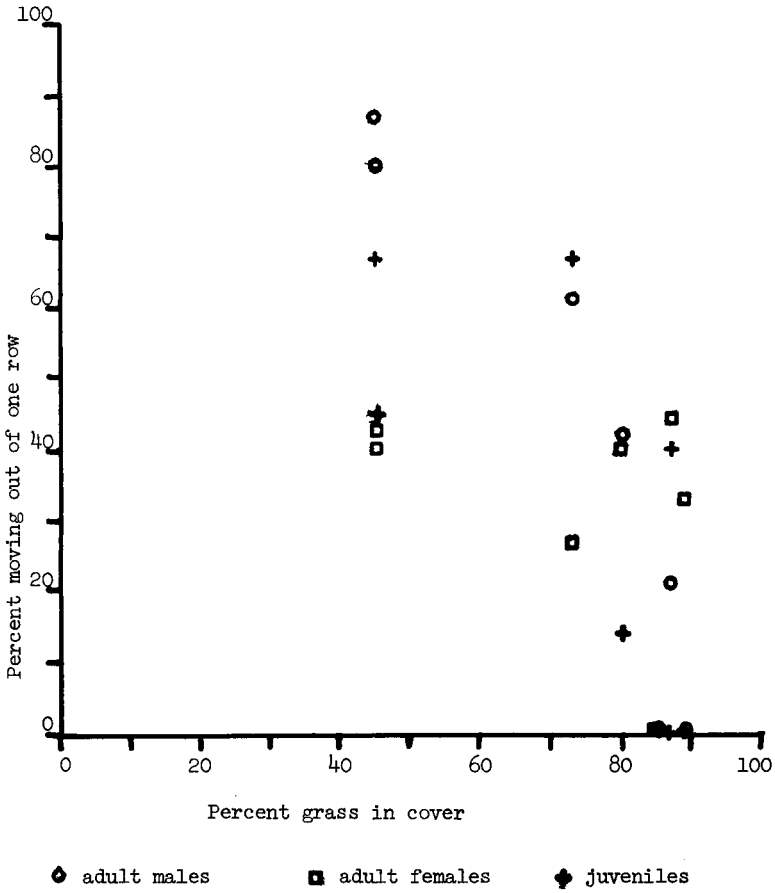

Figure 1. Relationship between percent of grass in orchard cover and percent of animals moving out of one tree row.

CONCLUSIONS

1. Although pine voles move into the adjacent orchard row quite often, few go farther across rows.

2. In the same row, moves of over 120 feet are not rare.

3. Keeping a cleaned-up strip between the trees and the nearest wild land, and treating the fence row, probably helps to keep outside voles from moving into the orchard after a control program.