

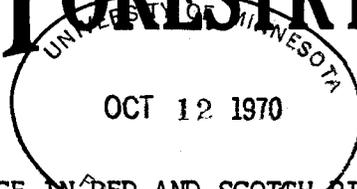
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POCKET GOPHER DAMAGE IN RED AND SCOTCH PINE CHRISTMAS TREE PLANTATIONS IN CENTRAL MINNESOTA

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The Mississippi Valley pocket gopher (Geomys bursarius bursarius, Shaw) has been recognized as causing considerable mortality in Christmas tree plantings in Minnesota. However, no published information giving the extent of damage to be expected in the absence of control measures is available. The greatly expanded rate of tree planting due to various governmental programs and the increased interest in the growing of Christmas trees in recent years has accentuated the need for such information.

Data were collected for this project from case history studies of plantations in June and July of 1960 and 1961. These plantings were located within a 50-mile radius north of Minneapolis on the Zimmerman sandy soil type where much of the Christmas tree growing activity in Minnesota is concentrated. Most of the planting to date has involved red pine (Pinus resinosa Ait.) and Scotch pine (Pinus sylvestris L.) and the study was confined to these species.

Gopher control by poisoning on four of the 26 plantings had been continuously maintained from the time of planting. On the remaining plantings there was no control. Mortality was determined by individual inspections of all trees in every fourth row in each planting. Each killed tree was pulled out of the ground to insure that mortality was a result of gopher damage to the roots. Trees were tallied as living, killed by gophers in 1960 or 1961, and dead or missing due to other causes.

In the four plantations where pocket gopher controls had been applied, one-fourth of the trees, a total of 1,915 red pine and 1,092 Scotch pine, were examined. These plantations were three, four, five, and six years of age in 1961. Mortality records collected for these four plantations showed less than 0.1% of the total number of trees planted had been killed by gophers in 1960 and 1961.

Of the 21,653 trees examined in the 15 red pine plantations where no control was exercised, 676 or 3.1% were killed by gophers in 1960 and 1961; and 9,106 or 42.1% were dead or missing from all causes including earlier gopher damage. The greatest amount of gopher damage to red pine occurred in plantings two to six years of age. In these age classes an average annual mortality of 2.6% to 2.7% of the total trees planted occurred in 1960 and 1961. Cumulative mortality for the ten age classes studied was 15.7% on all red pine plantings. One year old plantations and plantations more than six years old showed mortality of 1.1% or less.

Of the 4,983 trees examined in the seven Scotch pine plantations, 193 or 3.9% were killed by gophers in 1960 and 1961; and 2,681 or 53.8% were dead or missing from all causes including earlier gopher mortality. The greatest amount of gopher damage occurred in plantings one to five years of age and averaged 2.5% per year of the total trees planted. Cumulative mortality for the seven age classes studied was 12.6% on

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all Scotch pine plantings. After the fifth year, mortality due to gophers was less than 0.4%

Table 1. Average Annual Percent of Pocket Gopher Mortality
 Based on 1960 and 1961 Observations

RED PINE				SCOTCH PINE			
Age Class of Planting	Number of Gopher-Killed Trees	Total Number of Trees Planted	Average Annual Percent of Trees Killed	Age Class of Planting	Number of Gopher-Killed Trees	Total Number of Trees Planted	Average Annual Percent of Trees Killed
1	4	1601	0.2	1	14	622	2.3
2	45	1728	2.6	2	39	1435	2.7
3	111	4296	2.6	3	51	1264	4.0
4	194	7337	2.6	4	32	2356	1.3
5	159	5901	2.7	5	53	2711	2.0
6	74	2746	2.7	6	4	1192	0.3
7	12	1561	0.8	7	0	386	0.0
8	46	4091	1.1				
9	28	8294	0.3				
10	3	5030	0.1				

The percentage of mortality per year was approximately the same for red and Scotch pine. Faster juvenile growth of Scotch pine may account for the rapid decline in mortality after the fifth year and the lower total mortality than was sustained by the slower growing red pine.

Considerable variation in gopher mortality was found among individual plantations. Differences in damage may be due to the gopher populations before planting, the fluctuations of gopher populations following planting, presence or absence of predators, and other factors. Christmas tree growers who controlled gophers estimated the population density to be about 4 to 6 animals per acre. In some areas the writers estimated the population may considerably exceed these estimates.

Observations in young plantations indicated a heavy loss as represented by all other dead or missing trees due to one or more of the following factors: poor planting stock, poor planting methods, adverse climate after planting, grass competition, winter-kill, and losses to insects and disease. Losses in one and two-year plantings, from causes other than gophers, ranged from 28 to 55 percent.



Gopher Damage to a Four-Year-Old Red Pine.

These data show that gophers are a serious factor in causing red and Scotch pine mortality in Christmas tree plantations in central Minnesota. Total mortality on an average ten-year-old red pine plantation, as determined by 1960 and 1961 observations, was 15.7% of the total trees planted. Total mortality on an average seven-year-old Scotch pine plantation, as determined by 1960 and 1961 observations, was 12.6% of the total trees planted. Considerable variations in the intensity of damage occur between plantations and from year to year. While additional research on pocket gopher food habits and life history is needed to fully understand the problems involved, the effectiveness of diligent control measures was documented in this project.