Jackrabbits injure ponderosa pine seedlings

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Jackrabbits, actually hares *(Lepus* app.), range throughout much of the Western United States (7). Although these animals are most common in grassland or shrub communities, they also frequent open, forested habitats (1,4).

Black-tailed jackrabbits *(L, californi*cus) are present in many stands of ponderosa Pine (Pin us *ponderosa)* in central Oregon, especially where this forest type is interspersed with brush or grassland. In contrast to their sometimes damaging effects on agricultural crop or range lands, forestland jackrabbits appear to have little direct effect on tree crops except during forest regeneration. Then, like their forest-dwelling counterpart, the snowshoe hare *(L. americanus),* they may damage tree seedings (9, 3, 6).

Although apparently not widespread, damage to conifer seedlings by jackrabbits has been reported from Nebraska (10) and central and eastern Oregon, but little quantitative information is available on mortality and height losses caused by these animals (4, 5). This note gives an account of injuries by jackrabbits to an experimental planting of ponderosa pine.

Study Area and Methods

The investigation was conducted on a portion of the Cave Mountain Bum, near the town of Chiloquin in southcentral Oregon. The site had been occupied by a pine-bitterbrush needlegrass plant community before wildfire in 1959 reduced it to needlegrass with a scattering of bitterbrush and a few forbs. Efforts to reforest the area were largely unsuccessful mainly because pocket gophers destroyed a substantial portion of the trees that were planted from 1961 to 1963; no effective method has been found to control losses from gophers (4, 2). Jackrabbits were observed on the area-tracks and droppings were abundant, and wellworn trails made by these animals were present.

The ponderosa pine seedlings considered here consisted of 432 individuals from a group of 1,080 nursery-grown trees planted at 8- by 8-foot spacings in plots of 36 trees each. Data for this report were gathered from 12 of 30 such plots systematically spaced over about 14 acres and examined three times each year, from planting in March 1966 through September 1970.

Results and Discussion

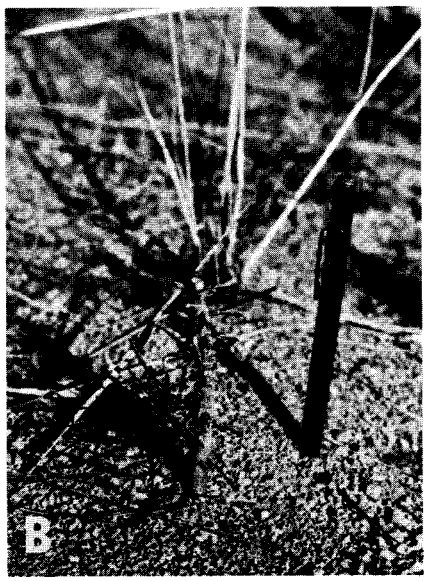
Jackrabbits clipped the main stems of 43 percent of the sample trees during the fall and early winter of the first year after planting. Of those clipped, 34 percent (15 percent of the number planted) subsequently died. The seedlings averaged about 17 centimeters in height when clipped, and injuries ranged from severance of the stem near ground level to removal of 1 or 2 centimeters of terminal growth (fig. 1). Many severely clipped seedlings appeared dead but were left undisturbed in place because local field observations and documentation (8) indicated that pines damaged by hare and rabbits possess a remarkable ability to survive.

Figure 2 shows heights of clipped and unclipped trees. Unlike Hunt's findings (8) with loblolly pine *(P. taeda)* in Texas, height differences initiated by jackrabbit clipping in our study continued to widen through four growing seasons after the damage occurred. In fact, nearly half of the more severely injured trees barely equaled their predamage heights after 4 years, and some of these will not survive.

Although no population estimate was attempted, it is likely that jackrabbit numbers were high at the time of planting. The evidence described earlier supports this assumption, and is further strengthened by frequent sightings of animals in nearby pine-bitterbrush stands. Observations of jackrabbits and signs of their presence declined sharply the second year and have been much less frequent since then.

It is too soon to predict the final impact of the observed clipping damage. Hunt (8) found that loblolly pine seedlings damaged by cottontail rabbits *(Sylvilagus* spp.) survived and grew nearly as well as undamaged trees

Figure 1.—Jackrabbit injuries to ponderosa seedlings, November 1966: A. Severe clipping—this tree subsequently died; B. moderate clipping—this tree survived (note uneaten portion of stem that often accompanies clippings by lagomorphs).

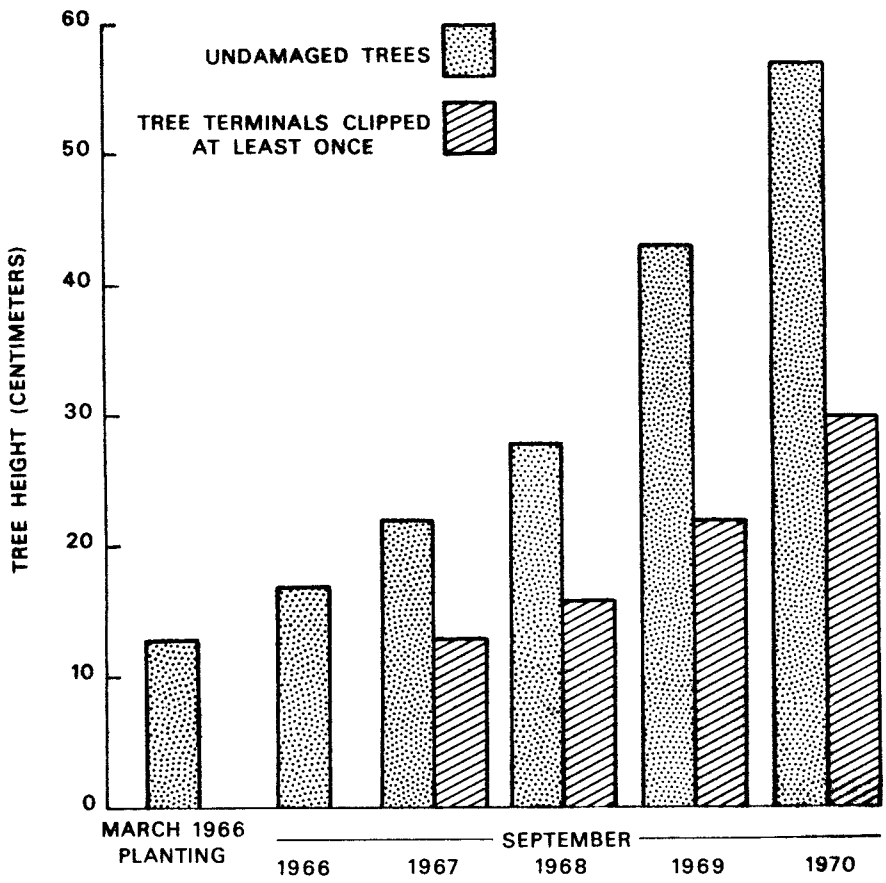


during 4 years following planting. Little residual effect was reported *(11)* after 30 years on loblolly and shortleaf *(P. echinata)* pines, and greater, but not severe, effects on slash pine *(P. elliottii)* that had been damaged by rabbits shortly after planting.

In the present study, jackrabbit damage alone had not reduced stocking drastically in any plot after 4 years, and mortality of clipped trees, although continuing, has amounted to little more than that of uninjured trees (15 percent vs. 9 percent, respectively). An additional 10 percent of the clipped trees were subsequently lost to gophers, and some of these might also have perished from jackrabbit damage alone.

More important, perhaps, clipped trees averaged only about half the height of unclipped trees and showed no signs of closing this gap (fig. 2). This slower height growth, which was accompanied by a reduction in overall tree size, could be a precursor to further heavy losses from pocket gophers, the major cause of tree mortality on the site. Delays like these in growth will markedly lengthen the time that rabbit-injured trees are highly susceptible to losses from gophers. Thus, the indirect result of clipping by jackrabbits demonstrated here may

Figure 2.—Heights of unclipped and clipped ponderosa pines through five growing seasons after planting. Differences in heights each year are significant at the 1-percent level.



have an unfavorable impact on stocking levels and could contribute strongly to the ultimate failure of this experimental planting, as well as operational reforestation projects subjected to similar sequences of injury.

Literature Cited

1. Bailey, Vernon.
   1936. The mammals and life zones of Oregon. N. Am. Fauna No. 55,416 p.
2. Barnes, Victor G., Jr., Paul Martin, and Howard P. Tietjen.
   1970. Pocket gopher control in Oregon ponderosa pine plantation. J. For. 68: 433-435.
3. Black, Hugh C., Edward J. Dimock II, Wendell E. Dodge, and William H. Lawrence.
   1969. Survey of animal damage on forest plantations in Oregon and Washington. 34th N. Am. Wildlife & Nat. Resour. Conf. Trans., p. 388-408.
4. Canutt, Paul R.
   1969. Relative damage by mammals to reforestation in Washington and Oregon. Wildlife & Refor. Pac. Northwest Symp. Proc. 1968:55-59.
5. Crouch, Glenn L.
   1969. Animal damage to conifers on National Forests in the Pacific Northwest Region. USDA Forest Serv. Resour. Bull. PNW-28, 13 p. Pac. Northwest Forst & Range Exp. Stn.
6. Evans, J., P. L. Hegdal, and R. E. Griffith.
   1970. Methods of controlling jackrabbits. 4th Vertebrate Pest Conf. Proc., p. 109-116.
7. Hall, E. Raymond, and Keith R. Kelson.
   1969. The mammals of North America. Vol. 1, 546 p. Ronald Press, N. Y.
8. Hunt, Ellis V., Jr.
   1968. How serious is rabbit damage on lohlolly pine seedlings? J. For. 66:853.
9. Lawrence, William If., Nelson B. Kverno, and Harry D. Hartwell.
   1961. Guide to wildlife feeding injuries on conifers in the Pacific Northwest, West. For. & Conserv. Assoc., 44 p.
10. Read, Ralph A.
    1971. Browsing preference by jackrabbits in a ponderosa pine provenance plantation. USDA Forest Serv. Res. Note RM-186, 4 p. Rocky Mt. Forest & Range -Exp. Stn.
11. Wakeley, Philip C.
    1970. Long-time effects of damage by rabbits to newly planted southern pines. Tree Plant. Notes 21: 6-9.