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PINE DWARFMISTLETOE ON THE PRINGLE FALLS EXPERIMENTAL FOREST

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Dwarf mistletoe (Arceuthobium campylopodum forma typicum (Engelm.) Gill) is widespread in the ponderosa pine forests of Oregon and Washington. The importance of dwarf mistletoe as a damaging agent in the pine forest of the Pacific Northwest was described by Weir^{3/} in 1916. In some localities present infestations are so heavy that forest productivity is doubtless greatly lowered. Many observers consider that even moderate infections cause growth reductions that are unwarranted in managed forests.

A closely related dwarf mistletoe (Arceuthobium vaginatum forma cryptopodium (Engelm.) Gill), which occurs on ponderosa pine in the southern Rocky Mountains and southwestern states, has been

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 - ^{2/} The author was employed by the Pacific Northwest Forest and Range Experiment Station, Deschutes Research Center, the summer of 1952 to conduct this study.
 - ^{3/} Weir, James R. Mistletoe injury to conifers in the Northwest. U. S. Dept. Agr. Bul. 360, 39 pp. 1916.

extensively studied and a technical foundation laid for the development of control practices. Much less is known about the northwestern species. A better understanding of the growth habit, rate of spread, and the damage from mistletoe is needed for intelligent planning of control procedures. To help supply the needed facts, a study of the relationship between mistletoe in the crowns of overstory trees and its intensity and distribution in the surrounding regeneration was made during the summer of 1952 on the Pringle Falls Experimental Forest within the Deschutes National Forest in central Oregon.

The study consisted of two parts. One was the examination of a 40-acre area where a fire, about 65 years ago, had destroyed all young growth and all but a few scattered older trees. Subsequently a new even-aged stand became established. Here, the spread of mistletoe from overstory trees into the new young stand was measured. This provided a picture of maximum spread and infection in a known period of approximately 60 years. The second part was a mapping of mistletoe conditions on 160 acres of typical virgin forest. The character of infection in the overstory trees and the intensity and extent of infection in the understory were studied further.

Some of the results of this study follow:

1. Greatest spread of infection was from overstory to understory trees. Pattern of infection suggested very little spread through even-aged stands where an overstory source of infection was absent. Maximum spread from overstory trees averaging 120 feet in total height was 130 feet in the direction of prevailing winds. Heavy infections were concentrated within approximately 33 feet of the overstory infection source. Beyond 33 feet, infections were moderate to light. Mapping in the virgin forest area indicated that the spread from an infected overstory tree may be somewhat less where the overstory stand is denser.
2. Infections in the understory trees were more numerous on the side of the tree toward the overstory source of infection. The trees in one infection center had exactly twice as many infections on the side nearest the source.
3. Significant variations were observed in resistance of young trees to mistletoe infection. Especially apparent was the high susceptibility of some trees. A very few trees appeared highly resistant.

4. No mistletoe occurred in a 40-acre even-aged stand of young ponderosa pine established after a fire, except where infection had spread from eight infected old-growth trees which had survived the fire. The effect of fire in eliminating mistletoe and enabling regeneration of a healthy forest is clearly demonstrated since a large part of the original stand was apparently heavily infected.
5. Distribution of infection was distinctly patchlike on 160 acres where mistletoe intensity was mapped. Some mistletoe was present on a total of approximately 32 acres, but heavy infections occurred on only about 2 acres. The removal of only 37 old trees would eliminate the source of overstory infection on 13 separate infection centers. This was in an area where the presence of mistletoe had previously been recognized, but where it had not been regarded as a problem.
6. Highly infectious overstory trees are often difficult to recognize. A vigorous crown with only a few inconspicuous, virile mistletoe plants may be far more infectious than a crown full of mistletoe brooms, especially if the brooms are on the lower branches. The most reliable method of identifying highly infectious overstory trees is by observing the vigor of the mistletoe plants. Accurate secondary evidence is provided by observing infections on understory trees, where an understory is present. The presence of heavily broomed branches in overstory trees is not of itself a reliable indicator of infectiousness.

These observations suggest the possibility of mistletoe control by management and silvicultural techniques, once the distribution of infection and nature of its spread are thoroughly understood.

Mistletoe studies are being continued in central Oregon during the summer of 1953 under a cooperative agreement between the Oregon State Board of Forestry, the Pacific Northwest Forest and Range Experiment Station, and the author. Additional information will be secured on the spread and distribution of infections. It is hoped that these studies may be continued well beyond 1953 and that they will produce: (1) An evaluation of the damage mistletoe is causing, (2) the nature and habits of the plant, and (3) recommendations for its control.