



EDITOR'S

FILE COPY

# RESEARCH NOTES

*Issued by the*

## PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION

No. 65

Portland, Oregon.

May 26, 1950

### THE EFFECT OF MANZANITA AND SNOWBRUSH COMPETITION ON PONDEROSA PINE REPRODUCTION

By

Walter G. Dahms

Pacific Northwest Forest & Range Experiment Station  
Deschutes Branch

What effect does a dense cover of manzanita and snowbrush have on the establishment and growth of ponderosa pine reproduction? Observations on this point on the Pringle Falls Experimental Forest resulted in the following conclusions: (1) the brush did not significantly affect the early establishment of pine seedlings, but (2) it sharply reduced the growth of established seedlings, and (3) manzanita (Arctostaphylos sp.) is much more severe in its effect on growth of pine seedlings than snowbrush (Ceanothus velutinus).

The area chosen for the observations is in a brush field on the south side of Pringle Butte. The brush became established as the result of two fires, one in 1919 and another in 1922. The ground cover consisted almost entirely of manzanita and snowbrush, with manzanita predominating. The brush grows in clumps that covered about half to two-thirds of the ground during the period of observation. A scattered stand of mature ponderosa pine provides a good seed source. The soil is a deep pumice, which is common to the upper Deschutes Basin. Elevation averages 4,700 feet.

A strip 1,000 feet long by 66 feet wide through this area was cleared of all brush in 1934. The manzanita was pulled up by hand, and the snowbrush was either grubbed out or chopped off at the ground line. A check strip of the same size was laid out adjacent to the cleared area. The development of brush plants and pine seedlings was followed on 20 milacre quadrats established along the center line of each strip.

Examinations of the quadrats from 1934 to 1947 showed that:

1. The density and height of brush increased on both strips. The density on the cleared strip in 1947 was about two-thirds that on the check strip in 1936 (fig. 1). The manzanita did not spread as rapidly after the clearing as it did after the original fires, but the snowbrush did. In fact, the density of snowbrush increased immediately after the clearing, but the manzanita did not start to increase until 1940 (fig. 2). The more rapid recovery of snowbrush after clearing may be due to sprouting of root crowns, as many of the snowbrush root crowns were left, but the roots of all manzanita were pulled.

Manzanita made more rapid height growth than snowbrush on the undisturbed check area. The average manzanita plant there increased in height from 2.9 feet in 1937 to 3.7 feet in 1947. The average snowbrush plant increased from 2.2 feet in 1937 to 2.5 feet in 1947.

2. Manzanita has been gaining at the expense of snowbrush. Once established manzanita appears to be the more vigorous competitor in the open brush fields; however, this may be largely an effect of winter kill or defoliation by caterpillars (*Nymphalis californica* Bdv.), both of which damaged primarily the snowbrush in recent years.

3. The natural germination and establishment of pine seedlings were not significantly affected by brush. Since 1934, 26 new seedlings were found on the cleared strip and 39 on the check strip. This difference may represent something more than sampling variation, but it did not prove to be significant. In addition, there is some inconclusive evidence to show that for any given year a pine seedling is more likely to survive under brush than in the open. This possibility, however, is far outweighed by increased height growth in the open.

4. Brush competition reduced height growth of pine seedlings. Seedlings originating during 1934 or earlier averaged 3.98 feet in height in 1947 on the cleared strip and only 1.24 feet on the check strip. Those originating during or after 1935 averaged 0.97 feet on the cleared strip and 0.41 feet on the check strip. In 1947, 35 percent of the quadrats on the cleared strip had trees that were taller than the tallest surrounding brush, while only 5 percent of the quadrats on the check strip had such trees.

5. Manzanita is more severe in its competitive effect on height growth of pine reproduction than is snowbrush. Pine seedlings that originated during the period 1922 to 1934 and grew under snowbrush averaged 1.79 feet tall in 1947. Seedlings that originated during the same period but grew under manzanita averaged only 0.78 feet tall.

This information indicates that heavy brush competition, especially from manzanita, must be reduced if pine seedlings are to make satisfactory growth. In the Pringle Falls area manzanita and snowbrush may possibly be helpful to the first establishment of ponderosa pine seedlings, and seedlings may survive under brush cover for many years. The records show, however, that seedlings will not make satisfactory growth under brush. Twenty-five years after the fire that created the brush field only a very occasional small pine tree was showing above the brush, while trees were making much better growth on the cleared area.

