



Timber Talks



Department of Fisheries and Forestry

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DRY MATTER PRODUCTION IN BUD-DORMANT PLANTS

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Two processes, photosynthesis and respiration, determine the net gain in the dry matter production of plants. The former, by which dry matter is gained, uses chlorophyll and water within the plant to utilize the sun's rays to manufacture complex foods from raw materials of the earth and atmosphere; the latter, from which most loss emanates, breaks down the food to provide energy to maintain the vital processes of the plant. During the active growing period, temperature affects the dry matter production of plants mainly by influencing the production of leaf area. When buds are dormant and new leaf surface is not being produced, temperature affects dry matter production by influencing the rate of photosynthesis per unit of leaf and the rate of respiration of the plant. As dormant buds are present on Douglas fir for most of the year, an understanding of the role of temperature during this phase of growth is important.

Bud dormancy was induced in newly germinated Douglas-fir seedlings, after they had been maintained for 90 days in a growth chamber under constant conditions of temperature, photoperiod and light intensity. When the buds were well set, the seedlings were divided into groups, given a 12 hr photoperiod with a 1000 ft - c light intensity and maintained for 7 weeks in different growth rooms at 2, 7, 13, 18 and 24°C temperatures. At the end of the period, stem diameter and dry weight of root and top of each plant was measured.

There was very little effect from temperature on dry matter production, the greatest amount being in the roots at 18°C and the least at 2°C. Basal stem diameter increased throughout the 7-week period but at different rates, the optimum being when the temperature was 18°C. Dry matter production per unit leaf surface for these bud-dormant plants was much less than for leaf producing seedlings grown at the same temperatures but with a longer photoperiod. The difference in production might partly be due to the dissimilar photoperiod and to the greater mutual shading of the leaves of the bud-dormant plants. It is conjectured that it is also due to the effect of temperature on the utilization of photosynthates, the products of photosynthesis, in growth and in their storage in plant organs.