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Abstract

Growth and nutritional responses of western hemlock to fertilization: A review

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Western hemlock (*Tsuga heterophylla*) dominates coastal forests of British Columbia. Current age-class distributions may reduce wood supply in the near term. Fertilization might improve growth and supply, but hemlock is considered unresponsive or erratic in its response. This paper reviews how hemlock has responded to fertilization in past studies and discusses some of the difficulties in interpreting those responses.

Topics include (1) nutrient deficiencies (2) experimental designs used, and growth and nutritional responses measured, (3) relationships between nutrient availability and growth of hemlock and associated conifers, and fertilization effects as influenced (4) by site and (5) by tree and stand characteristics. Few generalizations can be drawn from the literature. Phosphorus (P) additions may enhance response to additions of nitrogen (N), although P-deficient stands remain difficult to identify without measuring a response to P fertilization. For older (mid-rotation) stands, it is not possible to separate possible effects of stand age, stand density, and site and treatment applied (e.g., N-only versus N+P) on response to fertilization. There is a need to better define constraints on growth responses (nutrients, moisture, light) to fertilization in mid-rotation stands on key site types. Field experiments should be initiated to better define the relationships among stand age, stand density, stem growth, stand productivity, and stand leaf area, and to determine how these parameters may be influenced by nutrient availability. New experiments should apply more nutrients than N alone and should be designed to better characterize how nutrient supply and stand nutrient demand change with stand development.

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