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Sulfometuron methyl influences seedling growth and leaf function of three conifer species

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Abstract Seedling growth and gas exchange responses were measured for two potted seedling trials testing herbicide phytotoxicity to three important tree species of the Inland Northwest, USA. Media-filled pots were treated with sulfometuron methyl (Oust®) in varying concentrations and planted with seedlings of *Larix occidentalis* Nutt., *Pseudotsuga menziesii* var. *glauca* (Beissn.) Franco, and *Pinus monticola* Dougl. ex D. Don. Seedlings were grown in two trials to determine the effects of two important residue breakdown factors, substrate moisture and pH, relative to that of herbicide application rate on seedling health. Changes in seedling height, root-collar diameter, and root volume were morphologic variables of interest, and physiological variables measured were net photosynthetic assimilation, stomatal conductance, and transpiration rate. While three levels of media moisture and four levels of media pH had no effect on seedling performance, most growth and leaf function variables were hindered across application rate treatments of all three species. Label-recommended dosages resulted in growth suppression levels potentially detrimental to seedling establishment for all three species. This was most pronounced for *Pinus monticola*, in particular for root growth, where untreated control seedlings showed 109% more root volume growth than treated seedlings. We conclude that when possible, a species-specific application rate might be found that balances the benefits of vegetation control with the phytotoxicity to promote optimal growth gains.

Keywords Herbicide · Plantation establishment · Site preparation · Phytotoxicity

Introduction

Chemical site preparation is often used to control competing vegetation following harvest operations and during periods of initial tree seedling establishment (Muir and Zutter 1999) to promote the establishment and growth of desired species (Otchere-Boateng and Herring

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