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Influence of sulfometuron methyl on conifer seedling root development

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Abstract On three sites in coastal northwestern Oregon, USA, seedling root and shoot development were assessed for Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco), western hemlock (*Tsuga heterophylla* (Raf.) Sarg.), and western red-cedar (*Thuja plicata* Donn ex D. Don) container seedlings under varying sulfometuron methyl (Oust XP®) herbicide application treatments. Treatments consisted of application of 0.16 kg active ingredient (ai) ha^{-1} as a site preparation in fall 2003, a release application in fall 2004, or a control treatment with no application. Seedlings were planted in winter 2004 and measurements recorded in summer 2004, winter 2005, and summer 2005. During first season growth, western red-cedar seedlings showed the greatest negative impact to site preparation compared to the control with overall average new root length outside the root plug reduced by 67%. Significant reductions in root length also occurred for western hemlock (47%) and Douglas-fir (40%) seedlings. About 9 months after the release treatment, and 21 months after the site preparation application, there were no significant differences between treatments for any measured parameter. These findings suggest that seedlings under the site preparation treatment recovered from initial damage incurred to the root system. Lack of seedling response under the release treatment may be the result of opposing influences from the herbicide application associated with seedling phytotoxicity and enhanced seedling development resulting from effective vegetation control. Although our study was limited to 21 months following planting, reduced vegetation cover in the site preparation and release treatments suggests that these treatments may benefit future seedling growth.

Keywords Douglas-fir · Herbicide · Reforestation · Root growth · Seedling · Site preparation · Western hemlock · Western red-cedar

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