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## Release potential of giant sequoia following heavy suppression: 20-year results

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## Abstract

We tested the release potential of suppressed giant sequoia (*Sequoiadendron giganteum*) saplings in a plantation that was overgrown with shrubs at Blodgett Forest Research Station, CA in the inked conifer forest of the Sierra Nevada. As an ancillary case study, we compared the shrub removal method of release with a clear-and-plant method in an adjacent stand. Measurements of various morphological traits were collected prior to shrub removal, then sapling height growth response was measured periodically after the release treatment. In general, giant sequoia responded quickly to the removal of competing shrubs, growing steadily for 20 years following treatment. Among the morphological traits considered, live crown ratio alone was the most important factor in predicting relative height growth following treatment. Other traits were correlated with release. but had lower importance values as indicated by a model selection procedure. The 16-year-old saplings that were released in this study did not grow as large as 2-year-old seedlings that were planted synchronously with release, but both methods resulted in merchantable-sized trees 20 years after treatment. Planted seedlings outgrew released seedlings by 27% in terms of stature and by 37% in terms of diameter. The released stand is projected with a growth model to take 12 years longer than the planted stand to grow to an average diameter of 38 cm. The misperception of giant sequoia as having a low capacity for release may be related to its ambiguous categorization as a shade intolerant species.

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Keywords: Sequoiadendron giganteum, Release, Shade tolerance, Model selection

## 1. Introduction

Globally, the rising demand for forest products over the latter par( of the 20th century was increasingly met with yields front plantation forests (Sedjo. 1999). These plantations often utilize nonnative species that are fast-growing and tolerant of local climates. One species with potential as a plantation-managed species is giant sequoia ((Sequoiadendron giganteum) Lindl.) Buchholz). While not nearly as widespread as many other plantation species such as radiata pine (Pinus radiata D. Don), giant sequoia has been planted throughout Western Europe (Alexandrov et al.. 2002: Hartesveldt, 1969; Knigge. 1992; Melchior and Herrmann, 1987), where it is noted for both its superior growth and its potential for use in intensive forest management (Knigge, 1992). Interest in management of this species on several continents has been rekindled as plantation

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managers look for alternatives to traditional single-species plantations (e.g. Maclaren, 2004). Closer to its native range consisting of disjunct groves on the western slopes of the Sierra Nevada mountains in California, giant sequoia is occasionally planted on both public (Stewart et al., 1994) and private land (Heald and Barrett, 1999). As in Europe. it is not planted widely although it has potential as a fast growing tree, outperforming all associated species through the first decade even in small plantations

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