

Improving the Establishment and Growth of Douglas-fir and White Fir on Dry Sites through Fertilization and Stock Type

OPTION I

Objectives:

- 1) To determine the partial contributions of stock type and fertilization to Douglas-Fir and white fir survival, growth and total above ground biomass on dry sites in the interior Sierra/Cascade region of northern California and southwest Oregon under vegetation free conditions.
- 2) To determine the partial contributions of stock type and fertilization on initial root growth and total root volume (dry weights) after the first growing season in the field.
- 3) To determine differences attributable to site based on low and high precipitation zones

Methods:

Stock Sizes:

- a) Styro 8 (media must be standardized for all plugs!)
- b) Styro 20
- c) Plug 1 transplants--st-4's transplanted at a bed density of 12 per bed foot.
- d) Bare root 1-1's

Fertilizer Treatments:

- a) No fertilizer
- b) Incorporated slow release fertilizer. (3gr-st8, 10gr-st20)
- c) Spot fertilization at exponentially increasing rates (years 1,2 & 3) for the bare-root treatments. Mix to be determined.

Site and Plot Layout:

- a) Three sites will be chosen. based on site quality and precipitation levels (low site-low precip, med site-med precip, high site-high precip)
- b) Five treatment replicates per site.
- c) Plots size will be .015 acre planted at spacings of 5' x 5' (this will allow for thinning if initial size relationships are not determined by year 5). 56 trees will be planted per replicate which includes one buffer row on three sides of the plot and two buffer rows on the remaining side to allow for trees to be extracted to examine first year root growth.
- d) Seed will be from the zone where site is located for all stock sizes.
- e) Assume 3 years complete vegetation control for all treatments.
- f) The low site-low precip block will be on Roseburg Resources' ground, the medium site-medium precip block will be on Boise Cascades' ground and the high site-high precip block will be on Sierra Pacific's ground.

- g) Douglas-fir will be included on all sites. The Sierra Pacific and Roseburg Resources sites will each have Douglas-fir and white fir while Boise Cascades site will have ponderosa pine and Douglas-fir.
- h) Ponderosa pine container stock will be grown at Cal Forest Nursery, Douglas-fir container stock will be grown at Pelton and white fir container stock will be grown at PRT. 1-1's and the transplant stock will be grown at IFA Camby.
- i) Sites will need to be chosen and seed for the transplant stock sent to the respective nurseries by the first week of November 2000. Seed for the 1-0 container stock will not need to be shipped until fall 2001.

Root Volume Measurements:

- a) At time of lifting 20 seedlings of each stock type and fertilizer treatment will be washed free of media, roots cut and dried to obtain an initial average dry weight root volume by stock type.
- b) At the end of the first growing season in the field 5 seedlings from each replicate will be dug up, washed, roots cut and dried to determine increases from initial root dry weights and total dry root volume.

Tree Measurements:

- a) Trees will be measured initially when planted and at years 1, 2, 3, 4, & 5: groundline diameter, total height & dbh when achievable, survival, seedling volumes will be calculated.
- b) Foliar nutrient samples and dry weights per 100 needles will be collected and analyzed at years 1, 3, & 5.