Mechanical Preparation

1. Alvarez, I.F. and J.M. Trappe. 1983a. Dusting roots of Abies concolor and other conifers with Pisolithus tinctorius spores at outplanting time proves ineffective. Canadian-Journal-of-Forest-Research 13(5): 1021-1023.

Keywords: planting operations
site preparation
mechanical preparation
growth
tree/stand health
mycorrhizal response

Abstract: Dusting roots of Abies concolor, Abies magnifica var. shastensis, Pseudotsuga menziesii and Pinus ponderosa with Pisolithus tinctorius (Pt) spores when planted out produced no Pt mycorrhizae at the end of the first growing season. In the 3rd yr occasional Ptmycorrhizae had formed on A. concolor. Inoculations reduced seedling survival in some cases. High rates of spore application may have desiccated roots of the true firs and spore amounts applied need careful attention. Soil scarification and ripping significantly promoted growth of A. concolor seedlings compared with scarification alone.

OSU Link
Non-OSU Link

2. Bloomberg, W.J. 1988. Modeling control strategies for laminated root rot in managed Douglas-fir stands: model development. Phytopathology 78(4): 403-409.

Keywords: planting operations
site preparation
mechanical preparation
tree/stand protection
tree/stand health

Abstract: A model of laminated root rot caused by Phellinus [Inonotus] weirii was developed to assess potential control strategies in managed Pseudotsuga menziesii stands. The model mimicked key processes in disease initiation and development quantified as functions of time and space. These processes were horizontal and vertical tree root distribution, root contact with inoculum and among root systems, spread of mycelium through root systems, root decay, reduction of diam. growth in infected trees, tree mortality and persistence ofinoculum in roots of stumps and killed trees. The processes were expressed as mathematical functions which were integrated in a computer program to calculate spread of the disease and stand-growth loss and mortality. Data for quantification of functions were obtained by experiments and from the literature. Simulated control practices included infected stump removal, sanitation fellings and mixed planting of Douglas fir and resistant species. Accuracy of the model was tested by comparing calculated disease spread and mortality with the following data: (1) spread and damage in two 60-yr-old, 1-ha stands in Oregon, (2) results from a statistically based model for spread and damage that had performed satisfactorily, and (3) observed spread and

damage behaviour in stands of different ages and growth rates. Results from the model compared favourably with all of the above situations.

OSU Link
Non-OSU Link

3. Bloomberg, W.J. and G. Reynolds. 1988. Equipment trials for uprooting root-rot-infected stumps. Western-Journal-of-Applied-Forestry 3(3): 80-82.

Keywords: site preparation
mechanical preparation
tree/stand protection
tree/stand health

Abstract: Residual roots from Douglas fir (Pseudotsuga menziesii) and western hemlock (Tsuga heterophylla) were measured following stump-root extraction one yr after harvesting a 55-yr-old, 314 stems/ha, 47% Douglas fir, 17% maple (Acer macrophyllum), 16% red cedar (Thuja plicata), 6% western hemlock stand with 20% infection by Phellinus weirii in the Cowichan valley, Vancouver Island, Canada. Extraction was by a Caterpillar D8H with brush-clearing blade, a 180-hp backhoe or a 115-hp backhoe. All 3 machines recovered more than 90% of root vol. The small backhoe left significantly greater numbers and lengths of root residues per msuperscript 3 soil, though the vol. of residues was greatest for the Caterpillar. An earlier study suggested that a root density of 32 roots/msuperscript 3 was needed to produce one root contact; as the least efficient treatment by the Caterpillar left 23.2 roots/msuperscript 3 in the ground, it is suggested that this would provide insufficient contacts with a new tree crop to transmit infection.

OSU Link
Non-OSU Link

4. Hacker, A.L. and B.E. Coblentz. 1993. Habitat selection by mountain beavers recolonizing Oregon Coast Range clearcuts. Journal-of-Wildlife-Management 57(4): 847-853.

Keywords: site preparation
mechanical preparation
tree/stand protection
tree/stand health

Abstract: In Oregon, mountain beavers (Aplodontia rufa) are managed as pests in Douglas fir (Pseudotsuga menziesii) stands; they are normally removed from clearcuts prior to reforestation, but recolonization nevertheless poses problems to regenerating stands. Habitat selection by recolonizing mountain beaver was studied on 8 replanted clearcuts, 4 each of 2 different ages (1 yr old and 4-5 yr old), in the Coast Range mountains of Polk and Lincoln counties, Oregon between June 1989 and August 1990. Clearcuts were recolonizedthroughout, irrespective of distances from edge (Rsuperscript 2 = 0.01). Six habitat variables were selected by stepwise logistic regression to model recolonized versus non-colonized habitat. Mountain beavers selected areas with high amounts of small (<25 cm) and large diameter (>25 cm) woody debris, forage plants, and uprooted stumps; they were likely to recolonize areas that had soft soils and areas in drainages. The logistic function that

included these 6 variables had a correct classification rate of 85% based on a jackknife procedure.Forest managers should find these habitat features useful for predicting mountain beaver recolonization and damage. Potentially productive approaches to habitat management and site preparation are suggested, including reduction of habitat suitability and colonist numbers by minimizing dead wood accumulations, and provisioning of alternate food sources to minimize tree damage without reducing recolonization.

OSU Link
Non-OSU Link

5. Hedin, I.B. 1994. Mechanical site preparation on salal-dominated sites: five-year results. Forest-Engineering-Research-Institute-of-Canada

Keywords: site preparation
mechanical preparation
growth
stand conditions

Abstract: Trials began in 1987 on sites on Vancouver Island where salal (Gaultheria shallon) is a competitor to Douglas fir [Pseudotsuga menziesii]. Three equipment types were tested: the Mitsui Miike (an excavator-mounted rock grinding attachment), the TTS Delta disc trencher and an excavator with a ripper tooth and live thumb. All three mechanical site preparation treatments were equally effective at reducing the coverage of salal and other competing vegetation and improving Douglas fir growth performance. On sites where the disc trencher can operate, with gentle slopes and light to moderate slash, it is most cost effective because of greater productivity.

Non-OSU Link

6. Heilman, P. 1983. Effects of surface treatment and interplanting of shrub alder on rowth of Douglas-fir on coal spoils. Journal-of-Environmental-Quality 12(1): 109-113.

Keywords: planting operations
site preparation
mechanical preparation
growth
tree physiology
soil properties
tree/stand health

Abstract: Annual growth of Douglas-fir (Pseudotsuga menziesii (Mirb.) Franco) planted on topsoiled spoils at a coal mine near Centralia, Wash., was monitored for the first 6 y after planting. Treatments were contour bedding, contour bedding plus interplanted Sitka alder (Alnus sinuata (Reg.) Rydb.), and unbedded control. The bedding significantly increased growth of Douglas-fir in all 5 y of the study. Total height growth after 5 y was 35% greater than control on the bedding only plots, and 43% greater on the bedding plus Sitka alder plots. Height growth of Douglas-fir in the mixed stand was significantly greater during the 2nd and 3rd y of the study, but after 5 yr, no significant difference was evident in total height between the mixed and pure Douglas-fir plots.

Concentration of N in Douglas-fir foliage was significantly increased by bedding in the fifth but not in the fourth year. Interplanting with Sitka alder had no significant effect on N in Douglas-fir foliage. The top 0.3 m of soil in the ridged portion of the bedded area contained significantly less moisture over a summer than did the top 0.3 m of the unbedded soil. At deeper depths, however, soil moisture was not significantly affected by bedding. Wind damage caused by a severe storm that occurred after 5 y was very much greater on the unbedded plots (49% wind-thrown vs. 9 to 15% wind-thrown on the bedded plots) despite the smaller size of the trees on unbedded plots.

OSU Link
Non-OSU Link

7. Ketchum, J.S., R. Rose and B. Kelpsas. 1999. Weed control in spring and summer after fall application of sulfometuron. Western Journal of Applied Forestry 14:80-85.

Keywords: site preparation
mechanical preparation
chemical preparation
stand conditions

Abstract: This study tested the residual spring and summer efficacy of sulfometuron after applications in the autumn in second growth Douglas fir (Pseudotsuga menziesii) with red alder (Alnus rubra) and bigleaf maple (Acer macrophyllum) forest sites in the central Coast Range, Oregon, USA, which had been harvested in the summer. Sulfometuron alone (S) and sulfometuron plus imazapyr and glyphosate (SIG) were applied to vegetation on mechanically scarified sites and unscarified sites. The applications were replicated each month throughout autumn 1994. Vegetation cover was assessed in mid-June and mid-August 1995. The SIG treatment gave better control of vegetation than the S treatment, although cover was significantly lower for both herbicide treatments (9% to 54% for summed cover) compared to the control site (64% to 104% for summed cover). On scarified sites, the month of application, early or late autumn, did not significantly influence the efficacy of either treatment. On unscarified sites, however, applications of the SIG treatment later in autumn were less effective than early autumn treatments. Results suggest that autumn applications of sulfometuron are still effective in spring and may eliminate the need to treat sites again in the spring in order to achieve effective weed control.

OSU Link
Non-OSU Link

8. Knapp, W.H., T.C. Turpin and J.H. Beuter. 1984. Vegetation control for Douglas-fir regeneration on the Siuslaw National forest: a decision analysis. Journal-of-Forestry 82(3): 168-173.

Keywords: planting operations
site preparation
chemical preparation
mechanical preparation
prescribed fire
release treatments
chemical release

manual release
growth
yield
economics

Abstract: Records from 324 plantations in Oregon were used to calculate the effect on stocking of various methods of controlling competing vegetation before and after plantation establishment. A decision tree analysis using 6 management regimes on 5 stocking classes indicated that if no site preparation or release (other than broadcast burning to reduce fuels) were practised, the forest would produce 63% of the m.a.i. and 35% of the present net worth (PNW) expected if all means of control (chemical, manual and burning) were available and used. If only manual control methods were used 78% of the max. m.a.i. and 57% of the max. PNW would be expected. When all methods except phenoxy herbicides were available, the expected m.a.i. and PNW were reduced to no less than 90%. The yield reduction varied with aspect, and the type of prelogging vegetation. Declines were least on SW-facing sites that were originally predominantly conifers, and greatest on NE-facing slopes that had supported broadleaves. Limitations of the analysis are discussed.

OSU Link
Non-OSU Link

9. Knowe, S.A., W.I. Stein and L.J. Shainsky. 1997. Predicting growth response of shrubs to clear-cutting and site preparation in coastal Oregon forests. Canadian-Journal-of-Forest-Research 27(2): 217-226.

Keywords: planting operations
site preparation
chemical preparation
mechanical preparation
prescribed fire
stand conditions

Abstract: Cover-projection models were developed based on algebraic difference formulations of an exponential-power function to describe shrub recovery and development patterns following clear cutting, site preparation and Douglas fir (Pseudotsuga menziesii) planting at 4 sites in the Siuslaw National Forest, Oregon. The sites formed part of the Coastal Site Preparation Study initiated in 1980, in which the effects were tested of 6 treatments on shrub growth patterns. Treatments were: none other than scalping a 30-cm spot when each 2-0 seedling was planted (control); spot clearing by cutting to 15 cm height all woody vegetation within a 1.2 m radius of the seedling; spraying with glyphosate (2.52 kg a.e./ha) in early autumn 1980; broadcasting burning slash in midsummer 1980; manually slashing all woody vegetation in June 1980 and broadcast burning later in the summer; and spraying with picloram + 2,4-D (Tordon 101) in May or June 1980 (at 1.49 + 5.97 kg a.e./ha) and broadcast burning in the summer. Results on the development of Douglas fir and associated vegetation to age 10 yr have already been reported for this study (Stein (1995) Research Paper - Pacific Northwest Research Station, USDA Forest Service, No. PNW-RP-473; Knowe & Stein (1995) Canadian Journal of Forest Research 25 (9) 1538-1547). The shrub cover-projection models were developed by incorporating indicator variables into the model rate and shape parameters for the recovery of 3 specific shrubs (salal, Gaultheria shallon; thimbleberry, Rubus parviflorus; and salmonberry, Rubus spectabilis), and all shrubs. For salal, the shape parameter included an adjustment for burning treatments that delayed maximum cover by several years in comparison with unburned treatments. The rate parameter in the thimbleberry model was adjusted

for burning treatments; maximum cover occurred about 2 yr earlier in burned than in unburned treatments. Both rate and shape parameters in the salmonberry model were adjusted for burning treatments; delayed established but increased growth rate and less salmonberry cover are characteristic of burned treatments compared with the unburned treatments. The rate and shape parameters in the model for the shrub group included adjustments for burning treatments. Overstorey removal fostered shrub development, whereas site preparation treatments slowed and curtailed it. The final cover-projection models accounted for 68-92% of the total variation in cover, with the adjustments for burning accounting for 1.5-3.3% of the variation. The predicted growth patterns are consistent with trends in site occupancy and published autecological characteristics.

OSU Link
Non-OSU Link

10. Little, S.N. and D.R. Waddell. 1987. Highly stocked coniferous stands on the Olympic Peninsula: chemical composition and implications for harvesting strategy. Pacific-Northwest-Research-Station,-USDA-Forest-Service Research-Paper PNW-RP-384. 29 p.

Keywords: site preparation
mechanical preparation
soil properties

Abstract: An assessment is presented of macronutrients and their distribution within highly stocked, stagnant stands of mixed conifers on the Quilcene Ranger District, Olympic National Forest, northwest Washington, USA. These stands consisted of predominantly three species: western hemlock (Tsuga heterophylla), coast Douglas fir (Pseudotsuga menziesii var. menziesii), and western redcedar (Thuja plicata). Preliminary investigation suggested that the living crown contained a small portion of the nutrient capital on the site. Extracting this material from the site during harvest or site preparation should not pose a threat to future production of biomass. Bioassays suggested that no macronutrients were deficient for growth of Douglas fir seedlings. However, care should be taken during harvest and site treatment to protect the nutrient capital in dead material and in the forest floor.

OSU Link
Non-OSU Link

11. McLeod, A.A., R.C. Evans and R.K. Scagel. 1993. Conversion of understocked salal sites at Woss Lake, British Columbia. B.C. Ministry of Forests FRDA-Report 194. vi + 15 p.

Keywords: nursery operations
site preparation
mechanical preparation
fertilization
growth
tree/stand health
economics

Abstract: A trial comparing the effect of spot scarification and slow release NPK fertilizer application on stock types of coastal Douglas fir (Pseudotsuga menziesii) was conducted in a 25-year-old backlog site

occupied by a thick carpet of salal (Gaultheria shallon) in the CWHxm2 habitat of Vancouver Island, British Columbia. Bare root and container stock types were planted and treated, and mortality and growth were measured for 3 years. Despite the high fertilizer-related mortality of the bare-root stock type in the first year, the 3-year height growth performance of all treatments was better but more variable than that of the untreated seedlings. The value of site preparation and fertilizer for stimulating early growth varied by stock type. Bare-root stock did not respond strongly enough to fertilizer or site preparation to justify the cost of either of these treatments. Container stock types did not respond strongly enough to site preparation alone to justify the high cost of site preparation. The largest growth gains in the container stock types were associated with the combination of site preparation and fertilization.

OSU Link
Non-OSU Link

12. McNabb, D.H., K. Baker-Katz and S.D. Tesch. 1993. Machine site preparation improves seedling performance on a high-elevation site in southwest Oregon. Western-Journal-of-Applied-Forestry 8(3): 95-98.

Keywords: site preparation
mechanical preparation
tree/stand health
stand conditions
growth

Abstract: Douglas fir (Pseudotsuga menziesii) seedlings planted on areas receiving one of four site preparation treatments (scarify, scarify/till, soil removal, and soil removal/till) and on unprepared control areas were compared for 5 yr at a high-altitude, nutrient-poor site in the western Siskiyou Mountains. Fifth-year survival of seedlings was at least 85% among machine-prepared plots, compared to 42% on control plots. Cover of competing vegetation remained less than 25% during the period for all machine treatments. In contrast, vegetation cover on control plots was 30% at the time of planting and increased to nearly 75% after 5 yr. Competing vegetation clearly impeded seedling performance. The effects of unusually droughty conditions at the time of planting in 1982 were examined further by interplantingadditional seedlings in the soil-removal treatment in 1985. The interplanting was followed by more normal spring precipitation, and seedlings grew better over 5 yr than those planted in 1982. The slow recovery of competing vegetation and generally poor seedling growth on all treatments during both planting years are attributed to low soil fertility.

OSU Link
Non-OSU Link

13. Minore, D. and H.G. Weatherly. 1990. Effects of site preparation on Douglas-fir seedling growth and survival. Western-Journal-of-Applied-Forestry 5(2): 49-51.

Keywords: site preparation
mechanical preparation
prescribed fire
growth

tree/stand health
soil properties

Abstract: The effects of 5 site preparation treatment combinations (A: cable yarding + broadcast burning - B: tractor yarding + broadcast burning - C: machine piling + broadcast burning - D: machine piling + off-site burning - and E: machine piling + off-site burning + tilling) on Douglas fir (Pseudotsuga menziesii) growth and survival were studied in 1984-87. Seedling height, potential seedling height, survival percentages, soil-penetration resistances, and occurrence of visible soil humus were evaluated on 149 progeny-test plantations in westernOregon. Survival was not improved by mechanical site preparation (survival at 5 years was 84.8% for treatment A, 73.7% for C and 78.1% for E). Seedlings grown on compacted soils with low humus, associated with piling slash off site, did not grow as tall during their first 5 years as seedlings grown on similar sites where slash had been broadcast-burned (height 77 cm for treatments D and E, compared to 93 cm for A). Mechanical site preparation was not essential for Douglas fir survival, as long as competing vegetation is controlled. Increased soil compaction, loss of humus, and reduced 5 year height growth associated with mechanized slash removal indicated detrimental effects on site quality as well as tree growth.

OSU Link
Non-OSU Link

14. Parke, J.L., R.G. Linderman and J.M. Trappe. 1983b. Effects of forest litter on mycorrhiza development and growth of Douglas-fir and western red cedar seedlings. Canadian-Journal-of-Forest-Research 13(4): 666-671.

Keywords: site preparation
mechanical preparation
prescribed fire
mycorrhizal response
growth

Abstract: Preparation of forest regeneration sites for conifer planting often includes slash burning or physical removal of soil organic matter. Experiments were conducted to determine if organic matter contributes to the mycorrhizal fungus inoculum potential in forest soils and to compare the growth of Douglas fir and western red cedar (Thuja plicata) in untreated or pasteurized soils from undisturbed or cleared and burned forest sites with and without addition of untreated or pasteurized litter. Mycorrhizas were abundant on Douglas fir seedlings grown in undisturbed forest soil but developed similarly on red cedar seedlings in either type of soil. Litter and humus were found to include inoculum of both vesicular-arbuscular (VA) and ectomycorrhizal fungi. Litter amendment usually enhanced growth of host seedlings, but growth enhancement could not be fully attributed to addition of mycorrhizal inoculum or nutrients provided by litter. These findings suggested that other biological factors stimulated the growth of conifer seedlings and (or) activity of mycorrhizal fungi.

OSU Link
Non-OSU Link

15. Piatek, K.B., C.A. Harrington and D.S. DeBell. 2003. Site preparation effects on 20 year survival and growth of Douglas-fir (Pseudotsuga menziesii) and on selected soil properties. Western-Journal-of-Applied-Forestry 18(1): 44-51.

Keywords: site preparation
mechanical preparation
prescribed fire
tree/stand health
growth
soil properties

Abstract: Long-term effects of site preparation on tree performance and soil properties are not well known. Five site preparation treatments were evaluated to determine how they affected survival and growth of Douglas-fir (Pinus menziesii) 3, 10, and 20 years after planting, and soil bulk density, C, N, P, and organic matter concentrations at 0 to 20 cm soil depth 21 years after planting. The site preparation treatments were imposed following logging of three harvest units of old-growth forest on a volcanic soil in southwestern Washington, USA; the units were logged to leave 17, 38, and 53 tonnes/ha of woody residue. The site preparation treatments were hand-pile-and-burn, machine-pile-and-burn, scarification, broadcast burn, and control. Mean survival ranged from 86% at age 3 to 70% at age 20, and average tree heights at 3, 10, and 20 years were 0.6, 4.1, and 11.7 m. The scarification treatment had the best growth; at age 20, its average tree was 21% taller, 26% larger in diameter, and 82% greater in volume than the control. The hand-pile-and-burn treatment did not differ from the control in tree growth; the machine-pile-and-burn and broadcast burn treatments were intermediate in their growth response. Average soil bulk density was 0.74 g/cm3, organic matter concentration was 118 g/kg, and C, N, and P concentrations were 49, 1.6, and 0.7 g/kg with no significant treatment effects. Site preparation may have benefited growth of the trees on these units by decreasing competition from invading and regrowing vegetation, increasing nutrient availability, or increasing soil temperature.

OSU Link
Non-OSU Link

16. Schneider, W.G., S.A. Knowe and T.B. Harrington. 1998. Predicting survival of planted Douglas-fir and ponderosa pine seedlings on dry, low-elevation sites in southwestern Oregon. New-Forests 15(2): 139-159.

Keywords: site preparation
mechanical preparation
prescribed fire
tree/stand health
tree morphology
stand conditions

Abstract: Four equations were developed by logistic regression for predicting the probability of Douglas fir (Pseudotsuga menziesii) and ponderosa pine (Pinus ponderosa) survival for the first (0-1) and first to third (1-3) growing seasons after applying mulching, radial scalping (removal of all vegetation and a thin layer of soil in a 1-m radius area around each tree), or artificial shading (shade cards) treatments in plantations in SW Oregon. Most of the sites had been burned by wildfire or prescribed fire before planting. Variables describing conifer size, levels of competing vegetation, presence

of silvicultural treatments, site factors, and climate factors were collected from 13 sites up to 6 yr after planting and examined as potential predictors of survival. Age, stem diameter, a competition index for shrubs, severity of growing season at time of treatment, average annual precipitation, aspect, and slope angle were predictors of Douglas fir survival during 0-1 and 1-3 growing seasons after treatment; the presence of silvicultural treatments was also a predictor only during the first growing season after treatment. Age, aspect, and slope angle were predictors of ponderosa pine survival over both 0-1 and 1-3 growing seasons after treatment; height-diameter ratio, competition indices for herbs, shrubs, and hardwoods, silvicultural treatment, severity of growing season at time of treatment, and average annual precipitation were also predictors only during the first growing season after treatment; crown width was a predictor of survival only during 1-3 growing seasons after treatment. When significant in the models (equations), predicted probability of survival increases with treatments, less severe weather conditions, diameter, crown width, age, and precipitation; probability decreases with increasing height-diameter ratio and competition indices for herbs, shrubs, and hardwoods.

OSU Link
Non-OSU Link

17. Thies, W.G. and E.E. Nelson. 1988. Bulldozing stumps and nitrogen fertilization affect growth of Douglas-fir seedlings. Canadian-Journal-of-Forest-Research 18(6): 803-806.

Keywords: site preparation
mechanical preparation
fertilization
growth

Abstract: Eight treatments involving stump removal (either all stumps removed or the plot left undisturbed) and broadcast application of ammonium nitrate (N at 0, 336, 672 or 1345 kg/ha) were applied to 0.04-ha circular plots in a clear felling on the Olympic Peninsula, Washington. Pseudotsuga menziesii seedlings were planted several months after treatment; d.b.h. and height were recorded 5 and 8 yr after planting. Results showed that either bulldozing stumps or application of nitrogen increased seedling growth. After 8 yr, bulldozing had increased seedling height and d.b.h. by 23 and 43%, respectively; increases caused by nitrogen fertilizer were 13 and 17%, respectively.

OSU Link
Non-OSU Link

18. Thies, W.G., E.E. Nelson and D. Zabowski. 1994. Removal of stumps from a Phellinus weirii infested site and fertilization affect mortality and growth of planted Douglas-fir. Canadian-Journal-of-Forest-Research 24(2): 234-239.

Keywords: site preparation
mechanical preparation
fertilization
tree/stand protection
tree/stand health
growth

soil properties

Abstract: A field study was established in a 4.9 ha clearcut on the west slope of the Cascade Range (44 degrees 21'N, 122 degrees 39'W), Oregon, to evaluate the effects of stump removal (of both infested and non-infested stumps) and fertilizing with ammonium nitrate on the incidence of laminated root rot (caused by Phellinus weirii) in Douglas fir (Pseudotsuga menziesii) seedlings. A 2x4 set of factorial treatments of stump removal in combination with nitrogen fertilizing was applied in August 1980 to 0.04-ha circular plots within the clearcut. Treatments included stump removal (either all stumps removed or the plot left undisturbed) and broadcast application of ammonium nitrate (0, 336, 672, or 1345 kg N/ha). Diameter at breast height and height of Douglas fir, planted as 2+1 bare root seedlings 4 months after treatment (in January 1981), were recorded 5 and 9 seasons after outplanting. Soil bulk density in the upper 20 cm was measured with a single-probe neutron densimeter. Stump removal reduced the number of seedlings killed by laminated root rot but had no significant effect on seedling growth. Stump removal increased soil bulk density only 7% as measured 9.7 years after treatment. Fertilizer increased the growth in diameter at breast height, and height growth of the seedlings but had no effect on mortality. There were no significant interactions between fertilizing and stumping treatments. Increased total soil N could still be detected on fertilized, nonstumped plots 9.7 years after treatment.

OSU Link
Non-OSU Link

19. Thies, W.G. and R.N. Sturrock. 1995. Laminated root rot in Western North America. Pacific Northwest Research Station, USDA Forest Service General Technical Report GTR-PNW-349. iv + 32 pp. p.

Keywords: planting operations
site preparation
mechanical preparation
fertilization
thinning
tree/stand protection
tree/stand health

Abstract: Laminated root rot, caused by Phellinus weirii, is a serious root disease affecting Douglas fir (Pseudotsuga menziesii) and other commercially important species of conifers in northwestern North America. This report gives an overview of the disease as it occurs in the Pacific Northwest in Canada and the USA. Information on recognizing crown symptoms and signs of the disease is presented. The disease cycle of laminated root rot, from initiation to intensification and distribution within infected stands, is described. Finally, disease management strategies during stand development and at stand regeneration are discussed. Features on the nomenclature of the fungus and on its management by silvicultural and mechanical approaches also are included.

OSU Link
Non-OSU Link

20. Wass, E.F. and R.B. Smith. 1997. Impacts of stump uprooting on a gravelly sandy loam soil and planted Douglas-fir seedlings in south-coastal British Columbia. Pacific-Forestry-Centre,-Canadian-Forest-Service Information-Report BC-X-368. vi + 15 p.

Keywords: site preparation
mechanical preparation
tree/stand protection
soil properties
stand conditions
growth

Abstract: Studies to determine levels and impacts of soil disturbance caused during root-disease control by stump removal were initiated on a cutover on southern Vancouver Island immediately prior to the control operation and the establishment of a plantation of Douglas-fir (Pseudotsuga menziesii). Soil surface condition was assessed on the stumped area. Soil disturbance was measured at 699 planting spots. Vegetation development was assessed at 10% of the spots. Of all planting spots, 180 were undisturbed soil, 277 deposits and 242 gouges. The soil, a gravelly sandy loam, increased naturally in soil density with depth from 1.05 t/msuperscript 3 at the surface to over 1.60 t/msuperscript 3 at depths more than 40 cm. Disturbance did not significantly increase soil density. Unlike previous studies of this nature, ease of soil penetrability was increased by the stump uprooting disturbance and vegetation development was not greatly dissimilar between disturbed and undisturbed soil. The relatively low soil impacts were attributed to the ability of the excavator to pile stumps without pushing topsoil, and the low site sensitivity to compaction. These low impacts on soil and reduced vegetative competition on disturbed soil resulted in tree growth rates which were significantly greater after 10 years on deposits (12% in height and 18% in diameter) and gouges (6% in height and 8% in diameter) than on undisturbed soil.

OSU Link
Non-OSU Link

21. Woods, J.H., D. Kolotelo and A.D. Yanchuk. 1995. Early selection of coastal Douglas-fir in a farm-field test environment. Silvae-Genetica 44(4): 178-186.

Keywords: genetic tree improvement
planting operations
site preparation
mechanical preparation
release treatments
chemical release
manual release
genetic relationships
wood quality
growth

Abstract: Farm-field tests are progeny tests established using intensive site preparation, close spacing and nearly complete weed control. Early growth and wood density of coastal Douglas-fir (Pseudotsuga menziesii) in a farm-field environment for up to 7 years from seed were compared with stem volume and wood density from 11 field sites at age 13 (20-25 of commercial rotation). The farm-

field test material comprised 70 full-sib families from six 6-tree half-diallels (some reciprocals and missing crosses) without selfs. Parent trees were from natural stand selections in the coastal area of British Columbia, Canada, and the farm-field test was conducted on southern Vancouver Island. Family heritabilities were high for almost all traits in both the farm-field and field sites. Breeding-value correlations of farm-field heights with field stem volume at age 13 increased from a low of 0.5 for farm-field age 1 and levelled off at about 0.7 by farm-field age 3. Farm-field diameter with field volume age 13 breeding-value correlations were initially lower than those for height, but increased to 0.82 by age 7. Wood density breeding value correlations between field pilodyn assessments at age 13 and farm-field stem sections at age 6 were 0.83. Maximum family-selection efficiency per year (including a 5-year breeding delay), relative to direct selection on field volume 13, reached 162% using index selection on farm-field height and diameter at age 3. Within-family selection efficiencies per year were highest at age 1 and declined quickly thereafter. All selection in the farm-field test had a higher efficiency per unit time than selection in field tests. It is concluded that correctly established farm-field tests will provide greater per year gains in stem yield and wood density traits than field sites.

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