SMC Quarterly News

Stand Management Cooperative
College of Forest Resources, University of Washington
2nd Quarter 2005

www.standmgt.org

Dave Briggs, SMC Director

From the Director

This issue features an article summarizing results to date from a study at OSU to develop a branch profile model for Douglas fir. This project, funded by the USFS PNWRS Ecologically Sustainable Production of Forest Resources program, uses sample trees from SMC Type I Installations.

Since the last issue, the first three genetic gain trial/type IV Installations were planted, an international symposium on red alder was held with SMC as one of the sponsors, and a collaborative project between the Pacific Northwest Tree Improvement Research Cooperative and the SMC to evaluate tools for assessing wood stiffness and to evaluate the potential for genetic improvement of stiffness was initiated in a seed orchard/progeny trial on the Olympic Peninsula. Each of these is briefly summarized elsewhere in this issue.

inside:

Genetic Gain Trial/Type IV Douglas-fir Installations in the Grays Harbor Breeding Zone: A Joint Project of the Pacific Northwest Tree Improvement Cooperative, the USFS PNW Research Station Genetics Team, and the SMC

The first three genetic gain trial/type IV Installations, each containing 22 plots (treatment definitions and hypothetical layout of a site are shown in Figure 1) were planted in early March. This involved a great deal of pre-planting logistical planning starting with obtaining the seedlings from the Sylvan Vale nursery where seedlings were boxed and marked to coordinate with specific plots on the three installations. At each installation

Transporting seedlings to correct plots

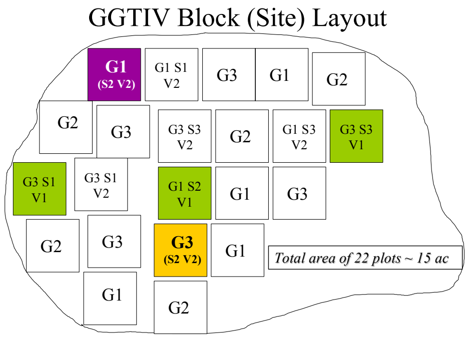


Figure 1. Definition of Treatments for GGTIV Installations and Hypothetical Plot Layout

GGTIV Treatments

- Spacing Factor Levels
  - (S1) 15 x 15', normally 200 SPA
  -(S2) 10 x 10', normally 440 SPA
  - (S3) 7 x 7', normally 900 SPA
- Genetic Quality Factor Levels
  - (G1) Unimproved
  - (G2) Moderate gain
  - (G3) High gain
- Vegetation Control Factor Levels
  - (V1) Current Practice
    - Defined as single site prep; used only in Type IV
  - (V2) Complete
    - Defined as 80% or greater bare ground until crown closure; standard on all GGT plots and on Type IV

careful coordination was needed to ensure that the correct boxes of seedlings were taken to each plot which previously had planting lines surveyed by the SMC field crew and pin-flagged by a contractor for the appropriate spacing. All went well and there will be follow-up visits this year to periodically check integrity of the fences around each installation. A sample of seedlings was measured prior to planting and the measurement protocols for the future were developed at a TAC meeting held on December 16, 2004. The cost to create these first 3 installations included about $32,000 to develop the seed; contract the Sylvan Vale nursery to grow the seedlings; sort, package and ship the seedlings; and planting. About double this amount was associated with site selection trips, surveying plots and planting lines, pin flagging seedling locations along the planting lines, site preparation (chemical spraying), and installing protective fencing. Work is currently underway to create three more installations in 2006 to complete expermental design.

Planting GGTIV seedlings

Alder log scaling and grading at Washington Alder LLC

International Alder Symposium

After nearly two years of planning, the International Red Alder Symposium was held on March 23-25 at the UW College of Forest Resources Center for Urban Horticulture. It was sponsored by BC Ministry of Forests, Carlwood Ltd, Cascade Hardwoods, Goodyear Nelson-Mt Baker Products, Hardwood Silviculture Cooperative, Northwest Hardwoods, Olympic Natural Resource Center, OSU Extension, Rural Technology Initiative, Stand Management Cooperative, USFS PNW Research Station, UW College of Forest Resources, Washington Alder LLC, Washington DNR, Washington Forest Protection Association, Washington Hardwood Commission, WSU Extension, Western Forestry & Conservation Association, Western Hardwood Association, and Weyerhaeuser Company. This was the 4th major conference or symposium on alder; others were held in 1967, 1977, and 1992. Key changes from the past are (1) the transformation from alder as a weed species to one of the most valuable species in the region; alder log prices now surpass Douglas-fir, (2) the current shortages of alder supply, and (3) growing recognition of the important role of alder in forested ecosystems. Collectively, these changes have sparked interest in management and silviculture of alder as well as rapid development of alder plantations and demand for alder seedlings.

Planted, managed alder plot of the Hardwood Silviculture Cooperative at Clear Lake Hill

The symposium began with a field trip, attended by 102 persons, that first visited the Washington Alder LLC sawmill in Mt Vernon, WA., where the group was given a very informative demonstration of alder log scaling and grading and got to see how modern efficient hardwood mills manufacture lumber. After lunch at scenic Clear Lake Hill, the group visited the Clear Lake Hill alder research plots on Goodyear Nelson land that were established in cooperation with the OSU Hardwood Silviculture Cooperative that are now 15 years old with some stands attaining an eight inch average dbh. The final stop visited a riparian environment where the riparian regulations for British Columbia, Oregon, and Washington were demonstrated and compared and the important role of alder in riparian ecosystems was discussed.

Lunch at Clear Lake Hill

The next 2 days were spent at the UW Center for Urban Horticulture with 170 attending. The program consisted of excellent speaker presentations, poster session, and discussions as to where we go from here. All presentations were captured by streaming video and will be available on DVD within the next few weeks from the Rural Technology Initiative, www.ruraltech.org. In addition the USFS PNW Research Station is contacting speakers to produce a published copy of the proceedings.

Progeny Trial Study: A Joint Project of the Pacific Northwest Tree Improvement Research Cooperative and the SMC

Randy Collier getting acoustic velocity of a log with the HM-200

The last issue noted the new project titled "*Non-destructive evaluation of wood quality in standing Douglas-fir trees and logs*" by D. Briggs, E. Lowell, E. Turnblom, B. Lippke, and P. Carter funded by the Rocky Mountain Experiment Station Agenda 2020 program and the UW College of Forest Resources. The objectives are to investigate the following questions.

(1) What are the relationships between the average stiffness of lumber or veneer in a log, stiffness (acoustic velocity) of the log, and stiffness (acoustic velocity) of the parent tree?

(2) To what extent are these relationships influenced by stand, tree, log, or environmental variables and what are the effects of silvicultural treatments and genetics?

(3) How can the natural variability of stiffness among trees within a stand be monitored and incorporated into decision support tools that assist managers in assessing if stands and stand treatments are within desired specifications and in making improved marketing decisions?

17 foot log & cross section disks above graft point

This study involves acquiring two new tools that measure acoustic velocity to estimate stiffness of wood within standing trees (the ST-300 tool) and within logs (the HM-200 tool), and relate standing tree and log acoustic properties to the stiffness of lumber and veneer products they contain. Within objective 2, it was proposed to collaborate with PNWTIRC to find a Douglas-fir progeny trial; preferably where trees can be removed by thinning so that individual trees from different families can be assessed for stiffness using the new standing tree and log acoustic testing tools. PNWTIRC is interested in exploring the potential for future genetic selections based on wood stiffness so pooling efforts made a lot of sense. In early March trees from the Hood Canal Seed Orchard and associated progeny trials, owned by Olympic Resource Management, became available for this work. A team of researchers from PNWTIRC and SMC converged on the seed orchard in mid-March when most of the parent trees used to create the progeny trials were to be removed. As trees were felled by a contractor, foliage samples for genetic evaluations, and 2-inch thick cross-section disks taken from each end of the 17-foot butt log (cut above the graft point) were taken. The cookies were measured for green density on site and will be used to measure a variety of wood properties with the Silvascan system. The logs were tested for acoustic velocity with both the HM-200 log tool and the ST-300 tree tool; we had to use the tree tool on the butt end of the log since we wanted to test above the graft point which was too high to permit use of the tool without resorting to cumbersome ladder work. At the butt end of the log, we obtained nine ST-300 acoustic velocity values at each of four locations around the circumference. This intensive sampling was done to permit an assessment of variation that will be helpful in designing future sampling strategies as well as to explore predictive relationships between the acoustic velocity obtained by the ST-300 and the HM-200.

Cross-section disks for wood properties

Bob Gonyea and Bert Hasselberg measuring & weighing cross-section disks

Later this year, we will evaluate the progeny from these parent trees. The trials are already marked for thinning and the progeny will be sampled in a manner similar to the parent trees. However, we plan to test standing trees with the ST-300 and process logs into lumber that will be tested for mechanical properties.

Influence of Fertilization and Thinning on Douglas-fir Branch Number and Size

Aaron Weiskittel, Doug Maguire, College of Forestry, Oregon State University, Corvallis, OR. and Robert A. Monserud, PNW Research Station, USDA Forest Service, Portland, OR.

Introduction

Silvicultural treatments applied during stand development can have a large influence on final log values because the number and size of branches formed are directly related to knot frequency and size, particularly in high intensity, short-rotation scenarios. This influence is particularly strong for treatments applied at an early age. However, few studies have fully examined branching patterns and dynamics in stands with varying levels of intensive silvicultural treatments such as fertilization and early thinning. Previous research on branch behavior in SMC plots either has been concentrated in young stands prior to canopy closure (Maguire et al. 1994), focused on only live branches (Maguire et al. 1999), or limited to branches located at breast height (Briggs & Turnblom 1999). This study seeks to expand our current understanding of changes in crown structure and dynamics imposed by intensive plantation management, and to improve our ability to predict influence of silvicultural treatments on wood quality and growth response processes.

Methods

During the summer of 2004, 36 trees from three SMC installations (Copper Creek, Roaring River, Toledo) were climbed and measured following methods similar to those described by Maguire et al. (1994). Four plots were chosen for sampling within each installation, namely control, fertilization, thinning, and fertilization + thinning. Within each plot, three trees were randomly selected from the 25^{th}, 63^{rd}, and 93^{rd} diameter percentile classes. Each tree was then climbed and every branch (living + dead) from the 3^{rd} whorl from the tip to stem base were measured for height of insertion and diameter. A subsample of branches on each tree was tagged for future reference and will be measured over the next two years for mortality, radial growth, and elongation.

Data were analyzed by first fitting model forms presented in Maguire et al. (1994) and Maguire et al. (1999) to branch number and maximum branch diameter, respectively. Indicator variables for each treatment type were added and the level of significance estimated. The models were each fitted using maximum likelihood with multi-level random effects and a specified error structure to account for the hierarchical nature of the data and to account for any autocorrelation between observations. The analysis was not restricted to the current live crown as has been done in other studies (Maguire et al. 1994, 1999; cf. Colin and Houllier 1991) because many of the branches that were live at time of silvicultural treatment, and whose responses are of interest, are now dead.

Results

Number of Branches

A modified form of the Maguire et al. (1994) equation accounted for 60.8% of the original variation in number of branches on an annual shoot. The number of branches on a shoot tended to increase with whorl height and whorl relative height above crown base, and decrease with whorl age and shoot length. Only thinning showed a moderate treatment effect ($p=0.055$) on the number of branches. For an average shoot in this study, the thinning

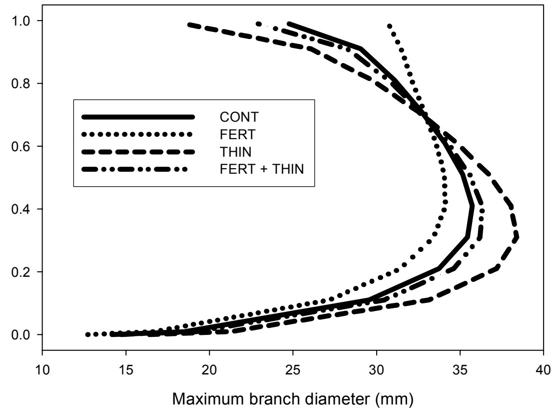


Figure 1. Relative maximum branch diameter profiles for a given DBH/HT and CR under the control, fertilization, thinning, and fertilization + thinning treatments. Relative height is calculated as branch height from stem base (m) divided by crown length (m) (tree tip is equal to 1.0). In this figure, DBH was 27.1 cm, HT was 18.3 m, and CR was 0.70.

treatment had a 7.1% decrease in the number of interwhorl branches per unit stem length. Inclusion of more tree-level variables such as DBH, HT, or CR did not significantly improve model fit.

Maximum Branch Diameter

A modified form of the Maguire et al. (1999) equation accounted for 50.8% of the original variation in maximum branch diameter sizes throughout the entire stem. Both fertilization ($p<0.0001$) and thinning ($p=0.006$) showed a significant effect on maximum branch size. Profiles for the mean tree in this study (DBH=28 cm, HT=18 m, CR=0.7) indicated that fertilization led to larger branches in the upper 20% of the stem, while thinning increased branch sizes in the portion of the stem just below the midpoint (Figure 1).

Discussion

Previous research by Maguire et al. (1994) in young SMC stands indicated branch number to be a function of several shoot characteristics such as location and length as well as tree-characteristics such as relative height in the stand. Both precommerical thinning (Maguire 1983) and fertilization (Brix & Ebell 1969; Mäkinen et al. 2001) have been previously shown to increase the number of branches on a tree. However, no relationship between stand density and branch count has been found in other studies on Douglas-fir (Briggs and Turnblom 1999; Grotta et al. 2004). The number of branches in this study was related most strongly to annual shoot characteristics (age, location, and length); thinning was associated with only a very slight decrease in the number of branches. Thus, the effect of stand density (thinning) probably has little consistent and long-term effect on the number of branches within an annual shoot, particularly over a long response period. The number may increase in response to newly available resources immediately following thinning, but this increase may be diluted by the long-term response of bud formation and branch initiation under more closed-stand conditions. The total number of live branches on the entire tree, however, is increased by thinning because of a reduction in crown recession rates following treatment.

The model presented by Maguire et al. (1999) only predicts maximum branch diameters of live branches, while the model developed in this study predicts maximum branch diameters throughout the stem. The model behavior near the top of the crown, however, is somewhat unrealistic because climbing safety precluded measurement of the top two whorls in the crown.

Table 1. Equation form, R^2 and root mean square error value for the two models presented in this analysis. All parameter estimates are significant at $p=0.05$. where NB is number of branch in an annual shoot, SHLEN is shoot length (m), WAGE is the annual shoot age, WHT is whorl height from the ground (m), DBH is diameter at breast height (cm), HT is total tree height (m), CR is crown ratio, DINC is depth into crown (HT – BHT), RHACB is whorl relative height above crown base (1.1 – (DINC/CL)), MBD is maximum branch diameter (mm), Z is relative height in the stem h/HT, h is branch height from stem base (m), FERT is an indicator variable for fertilization treatment (1 if treated, 0 otherwise), and THIN is an indicator variable for thinning treatment (1 if treated, 0 otherwise).

Table 1

MODEL	EQUATION	R^2	RMSE
Number of Branches	$NB = 18.0868*WAGE^{-1.0615} * WHT^{0.9239} * \exp(1.3484*RHACB - 0.1553*SHLEN - 0.0889*THIN)$	0.61	6.53
Maximum branch diameter profile	$MBD = (5.1819*DBH^{0.5607}) * \left(\frac{1-\sqrt{Z}}{1-\sqrt{CR}}\right)^{(1.5850*\sqrt{Z} - 2.1722*\exp(\frac{-DBH}{HT}) - 0.6832*(Z*\frac{DBH}{HT}) - 0.0612*FERT + 0.0833*THIN)}$	0.51	9.04

Thinning and fertilization, when applied separately, appear to have opposite effects on maximum branch diameter when compared to the untreated control. Fertilization primarily influenced the size of branches in the upper stem, while thinning enhanced branch sizes in the mid- to lower stem. This response is consistent with findings reported by Brix (1981). The smaller branch diameters in the mid- to lower stem of the fertilized trees most likely reflects a shift to higher foliage density in the post-treatment crown. It is also possible that foliage density is higher only in the upper portion of the crown in fertilized trees. This response would lead to increased shading and decreased growth of the lower branches within the trees' crown. When thinning and fertilization are combined, maximum branch diameters lie in a position intermediate between the separate effects of these two treatments.

These equations will be incorporated into a regional hybrid growth and yield model currently being developed to investigate the influence of intensive forest management on Douglas-fir wood quality. A future report will describe the influence of fertilization and thinning, as well as planting density and species composition, on branch radial growth, elongation, and mortality.

Literature Cited

Briggs, D.G. and Turnblom, E. 1999. Modeling number and size of branches in young coastal US Douglas-fir plantations as affected by silvicultural treatments. Stand Management Cooperative Quarterly 4: 7-12.

Brix, H. 1981. Effects of thinning and nitrogen fertilization on branch and foliage production in Douglas-fir. Canadian Journal of Forest Research 11: 502-511.

Brix, H. and Ebell, L.F. 1969. Effects of nitrogen fertilization on growth, leaf area, and photosynthesis rate in Douglas-fir. Forest Science 15: 189-196.

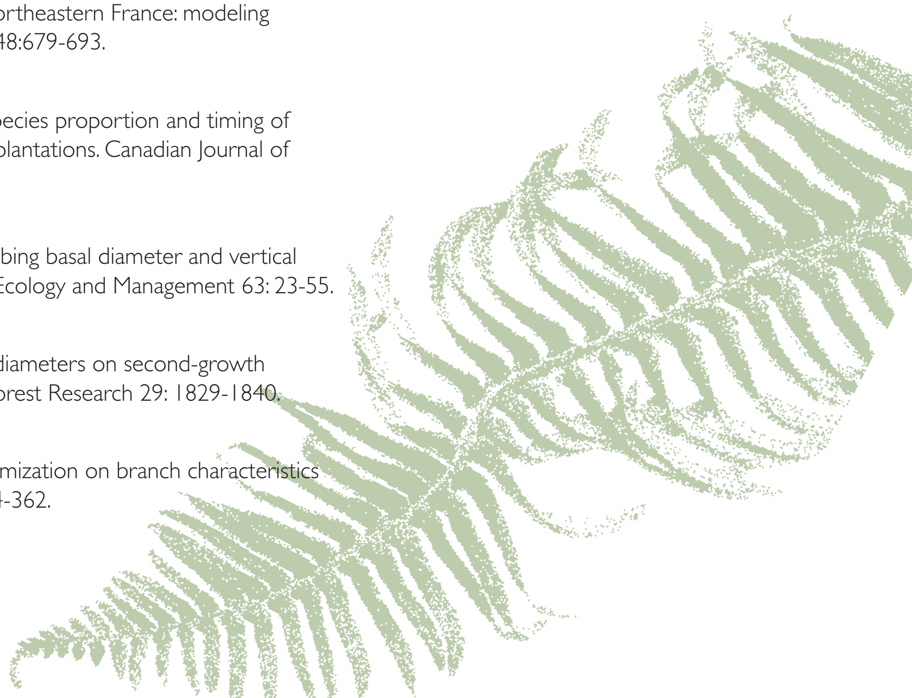
Colin, F. and Houllier, F. 1991. Branchiness of Norway spruce in northeastern France: modeling vertical trends in maximum nodal branch size. Ann. Sci. For. 48:679-693.

Grotta, A.T., Gartner, B.L., and Radosevich, S.R. 2004. Influence of species proportion and timing of establishment on stem quality in mixed red alder-Douglas-fir plantations. Canadian Journal of Forest Research 34: 863-873.

Maguire, D.A., Moeur, M., and Bennett, W.S. 1994. Models for describing basal diameter and vertical distribution of primary branches in young Douglas-fir. Forest Ecology and Management 63: 23-55.

Maguire, D.A., Johnston, S.R., and Cahill, J. 1999. Predicting branch diameters on second-growth Douglas-fir from tree-level descriptors. Canadian Journal of Forest Research 29: 1829-1840.

Mäkinen, H. Saranpää, P., and Linder, S. 2001. Effects of nutrient optimization on branch characteristics in *Picea abies*. Scandinavian Journal of Forest Research 16: 354-362.



Abstracts and Publications

Alexander Clark III., Bruce E. Borders, and Richard F. Daniels. Impact of vegetation control and annual fertilization on properties of loblolly pine wood at age 12. Forest Products Journal, Dec 2004 v54 (12) p90(7).

Abstract

Loblolly pine (Pinus taeda L.) stands in the Coastal Plain and Piedmont of Georgia were subjected to four intensive silvicultural regimes to monitor and record relative tree growth. Treatments included: intensive mechanical site preparation, complete vegetation control with multiple applications of herbicides, annual high rates of nitrogen fertilization, and complete vegetation control plus annual high rates of nitrogen fertilization. In response to the intense cultural practices, growth increased 270 percent in the Coastal Plain and 158 percent in the Piedmont compared to the intensive mechanical site preparation treatment. Increment cores were collected from trees at age 12 to determine the effect of treatments on early wood and latewood specific gravity (SG) and duration of juvenility. Trees were also felled to determine the impact of intensive cultural practices on wood stiffness, strength, and toughness. Annual vegetation control plus annual high rates of nitrogen fertilization increased the diameter of the juvenile wood core 62 percent and thus, the proportion of stem basal area in juvenile wood. Annual ring earlywood SG was not affected by treatments, but annual ring latewood SG was significantly reduced in fertilized and herbicide plus fertilized trees. Vegetation control did not significantly affect SG, strength, stiffness, or toughness but did significantly increase the juvenile core-wood diameter. Annual fertilization alone or in combination with vegetation control reduced weighted stem SG 6 to 10 percent compared to that of the trees receiving only the mechanical site preparation treatment. Annual heavy fertilization alone or in combination with vegetation control significantly reduced toughness, as well as strength and stiffness of juvenile wood. Thus, wood harvested from stands that since planting received annual vegetation control plus annual high rates of nitrogen fertilization would be less desirable for structural lumber production compared to wood from conventionally managed and planted loblolly pine stands.

David W. Hann and Mark L. Hanus. Evaluation of nonspatial approaches and equation forms used to predict tree crown recession. Can. J. For. Res./Rev. Can. Rech. For. 34(10): 1993-2003 (2004).

Abstract

Two nonspatial approaches for modeling tree crown recession (HCB) were evaluated by using 5341 observations from Douglas-fir (*Pseudotsuga menziesii* (Mirb.) Franco). The first approach applies a static height-to-crown-base (HCB) equation at the start and end of the growth period and uses the difference in these predictions as an estimate of HCB. This allometric method can be applied to species lacking HCB data from permanent plots. The incremental method directly predicts HCB from an equation developed from adequate permanent plot data. Two allometric and six incremental equation forms were examined. Also examined were three approaches for determining the end-of-growth-period tree and plot attributes used by the allometric method. Although the allometric method can produce unbiased estimates of HCB, the best allometric equation forms explained about one-half of the variation explained by the best incremental equation form. The two best incremental equation forms were modifications of a nonlinear logistic equation form previously developed for Douglas-fir. The modifications included using measured stand age (BHA) or predicted tree growth effective age (GEA) instead of measured tree age. The best equation form used BHA, which limits its application to modeling data collected from just even-aged stands. The equation form using GEA could be applied to modeling data sets from both even- and uneven-aged stands.

Robert J. Ross, John R. Erickson, Brian K. Brashaw, Xiping Wang, Steven A. Verhey, John W. Forsman, and Crystal L. Pilon. Yield and ultrasonic modulus of elasticity of red maple veneer. Forest Products Journal, Dec 2004 v54 (12) p220(6).

Abstract

The purpose of the study was to assess the potential for using red maple sawlogs to manufacture laminated veneer lumber (LVL). The primary objective was to determine the yield of ultrasonically graded veneer from red maple logs. A sample of 48 logs was obtained from six Eastern and Lake States in the United States. The logs were visually graded and shipped to a plywood manufacturing facility in northern Michigan where they were debarked, steamed for 72 hours, and then rotary peeled into nominal 1/8-inch- (standard-3-mm-) thick veneer. Special care was taken to ensure that each veneer sheet could be traced back to the log from which it came. The veneer sheets were dried to approximately 12 percent moisture content at the plywood mill, shipped to the USDA Forest Service, Forest Products Laboratory in Madison, Wisconsin, and nondestructively tested using a commercially available ultrasonic veneer grader. The average stress wave speed, obtained from the veneer grader, and the density of each sheet was used to compute its modulus of elasticity (MOE). Veneer yield and MOE were compared on the basis of geographical region of log origin: Lake States (Michigan and Wisconsin) and Eastern States (New York, Pennsylvania, Vermont, and West Virginia). Veneer yield was tabulated based on four categories: 54-inch- (137-cm-) wide sheets, 36-inch- (91-cm-) wide sheets, strips, and fishtails. The only major difference in yield between the two regions was observed in the No. 2 logs. The Eastern States' No. 2 logs yielded approximately 13 percent more of the original log volume as 54-inch (137-cm) sheets. The MOE comparisons were based on results from the 54-inch (137-cm) sheets because the yield of 36-inch (91-cm) sheets was low. When grouped, the yield of 54-inch (137-cm) veneer sheets was similar for the No. 1 and No. 2 logs, but lower from the No. 3 logs. Decreases in the total veneer yield corresponded with decreases in log quality. The MOE values of veneer from all logs had a mean value of 1.80 X [10.sup.6] lb./in.[.sup.2] (12.4 GPa) and a standard deviation of 0.33 X [10.sup.6] lb./in.[.sup.2] (2.3 GPa).

Xiping Wang, Robert J. Ross, David W. Green, Brian Brashaw, Karl Englund, and Michael Wolcott. Stress wave sorting of red maple logs for structural quality. Wood Science and Technology. Vol. 37 (2004): Pages 531-537.

Abstract

Existing log grading procedures in the United States make only visual assessments of log quality. These procedures do not incorporate estimates of the modulus of elasticity (MOE) of logs. It is questionable whether the visual grading procedures currently used for logs adequately assess the potential quality of structural products manufactured from them, especially those for which MOE is of primary concern. The purpose of this study was to investigate the use of stress wave nondestructive evaluation techniques to sort red maple logs for the potential quality of lumber obtained from them. Ninety-five red maple logs were nondestructively evaluated using longitudinal stress wave techniques and sorted into four stress wave grades. The logs were then sawn into cants and lumber. The same procedure was used to obtain stress wave times in the cants and lumber. The lumber specimens were then dried and graded using a transverse vibration technique. The results of this study showed that good relationships existed between stress wave times measured in logs, cants, and the lumber produced from the logs. It was found that log stress wave grades have positive relationships with the lumber grades. Logs with high stress wave grades produced high-grade lumber. These findings indicate that the longitudinal stress wave technique has potential in sorting logs and cants for the production of high MOE products.

Brian Strahm

***Kudos** to Brian Strahm, PhD student in forest soils, who received "best paper of session" awards for the two papers he presented at the Soil Science Society of America (SSSA) meetings in Seattle in November, 2004. The meetings included 19 sessions with over 200 papers and posters. "The awards are judged only for scientific merit and presentation, and is not a student-only' session," says Rob Harrison. "Student presentations are made in the same sessions as professors and other professional scientists. The awards are very competitive. It's common for CFR students to win awards, but this may be the first time that two papers from a single student received best of session awards at a single scientific meeting of SSSA.*

The papers were: B.D. Strahm and R.B. Harrison. Nitrate sorption in a variable charge soil of the Pacific Northwest.

B.D. Strahm, R.B. Harrison, B.L. Flaming, C.W. Licata, K.S. Petersen and T.A. Terry. Effects of organic matter retention on N mobility on an intensively managed Douglas-fir site.

E. Biblis, R. Meldahl, D. Pitt, and H.F. Carino. Predicting flexural properties of dimension lumber from 40-year-old loblolly pine plantation stands. Forest Products Journal, Dec 2004 v54 (12) p109(5).

Abstract

The predictive value of specific gravity (SG), rings per inch, and percent of latewood in relation to the flexural properties (modulus of rupture [MOR] and modulus of elasticity [MOE]) of lumber from thinned and unthinned 40-year-old plantation stands were analyzed using stepwise regression. It was found that none of the lumber properties were influenced by thinning. Using combined data from both stands, prediction equations for the MOR and MOE of 2- by 4-inch, 2- by 6-inch, and 2- by 8-inch dimension lumber from such plantation sawtimber were developed. For the MOR of 2- by 4-inch, 2- by 6-inch, and 2- by 8-inch lumber, significant regressions involving three factors (SG, rings per inch, and percent of latewood), one factor (SG), and one factor (SG), respectively, were found. Also, for the MOE of 2- by 4-inch, 2- by 6-inch, and 2- by 8-inch lumber, significant regressions involving two factors (SG and ring per inch), three factors (SG, rings per inch, and percent of latewood), and two factors (SG and ring per inch), respectively, were established. Moreover, regression equations for MOR versus MOE for the three lumber sizes were derived.

Belz D. Severing Red Alder: Timing the Cut to Achieve the Best Mortality. Western Journal of Applied Forestry, July 2003, vol. 18, no. 3, pp. 199-201(3)

The best time to cut red alder varies. Mortality shifts across regional zones. The most effective time to cut is not determined by calendar date, but instead depends on environmental, biological, and physical factors that affect initial budbreak and potential mortality. Several trials and continuing observations lead the author to believe air temperature and seasonal moisture, along with carbohydrate reserve, are the more potent influences. These influences affect the time to begin cutting, how long cutting can continue, when cutting should stop, and the degree of mortality. Monitoring budbreak date and moisture patterns can be used to determine a favorable window of opportunity that will produce 50% or higher mortality on the cut red alder. The cutting window can be used across wide geoclimatic zones with good success.

Mariano Amoroso,

***Kudos** to Mariano Amoroso (MS, UW CFR, 2004), currently a PhD student at UBC, who received "2nd Place" for his poster "On the Effects of Tree Crop Rotation: Red Alder following Alder or Douglas-fir; Douglas-fir following Fir or Alder" presented at the International Red Alder Symposium in Seattle on March 23-25, 2005. Streaming Videos of the conference can be purchased by contacting Megan O'Shea, moshea@u.washington.edu.*

Upcoming Meetings and Events

May 11-13, 2005 – International Conference, "Transfer of Forest Science Knowledge and Technology." McMenamin's Edgefield Inn, Troutdale, OR. For more information visit: http://www.fs.fed.us/pnw/calendar/tech-transfer/description.shtml

May 31-June 3, 2005 – Integrated Management of Forest Landscapes for Ecological and Social Values: Using ecological forestry for forestland management. H.J. Andrews Experimental Forest, Blue River, Oregon. For more information visit: http://www.westernforestry.org/intmgmtforland/course.htm.

June 12-16, 2005 – GPS Workshop. Pack Forest, University of Washington, Eatonville, WA. For more information visit: http://www.ruraltech.org/training/gps/index.asp.

June 13-15, 2005 – The 5th North American Forest Ecology Workshop. Aylmer, Quebec. For more information visit: http://www.unites.uqam.ca/gref/nafew2005/index.htm.

June 20-24, 2005 –The 5th International Conference on Forest Vegetation Management: Useable Science, Practical Outcomes and Future Needs. OSU, Corvallis, OR. For more information visit: http://outreach.cof.orst.edu/icfvm/index.htm.

July 4-7, 2005 – 2005 Western Mensurationists Meeting. Naniloa Resort, Hilo, HI. For more information visit: http://www.westernforestry.org/wmens/m2005/m2005.htm.

July 10-23, 2005 – WFGA - 50th Anniversary Looking Back - Looking Ahead. OSU, Corvallis, Oregon. For more information visit: http://www.westernforestry.org/wfga/wfga.htm.

July 19-21, 2005 – IFEI - Pacific Northwest, USA Forest Harvesting Study Tour. San Francisco, CA. For more information visit: http://ifei.cof.orst.edu/IFEIstudyTour.htm

September 20-21, 2005 – SMC Annual Fall Meeting and 20th Anniversary, Pack Forest, Eatonville, WA. For more information visit: http://www.standmgt.org.

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Stand Management Cooperative

SILVICULTURE ▪ NUTRITION
WOOD QUALITY ▪ MODELING