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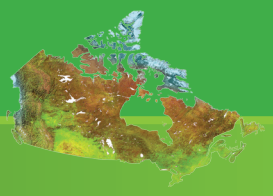

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Journal Articles

Krakowski, J., Park, Y.S., and El-Kassaby, Y.A. 2006. Early testing of Douglas-fir: wood density and ring width. *Forest Genetics* **12**: 99–105.

Early genetic control over juvenile ring width, ring density, and earlywood–latewood density ratio in coastal Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*) was assessed using seven disconnected diallel crosses with six clones in each set. Annual and composite traits were measured for 104 families over three years. Variance due to general combining ability for density traits was significant. Heritability estimates were consistent with earlier reports on the same species (annual: 4–22%; combined: 9–34%). Variance due to specific combining ability and heritability increased with age. Year by family interaction was always significant, except for composite wood density ratio. Random error variance accounted for 64–82% of total phenotypic variance for individual years, and 50–78% cumulatively. The relatively stable general combining ablity variance over years indicates that wood properties will respond incrementally to selection in a breeding program and that genetic trends in early traits will strengthen over time. Although inversely correlated, coarse-filter selection for wood density and diameter growth is feasible on three-year-old progeny based on ranks of the top and bottom few crosses; however, selections should be made on older trees since genetic parameters vary before stabilizing by age twelve to fifteen in this species.

Labrecque, S., Fournier, R.A., Luther, J.E., and Piercey, D. 2006. A comparison of four methods to map biomass from Landsat-TM and inventory data in western Newfoundland. *Forest Ecology & Management* **226**: 129–144.

Spatial measures of forest biomass are important to implement sustainable forest management, monitor global change, and model forest productivity. Several methods for estimating forest biomass by remote sensing have been developed, but their comparative advantages have not been evaluated for large areas in Canada. This study compares four methods to map forest biomass on an extended pilot region (20,000 km^2) located in western Newfoundland. The methods include: (i) Direct Radiometric Relationships (DRR), (ii) k-Nearest Neighbors (k-NN), (iii) Land Cover Classification (LCC), and (iv) Biomass from Cluster Labeling Using Structure and Type (BioCLUST). The results of each method were evaluated using an independent set of ground survey plots and compared with a baseline biomass map generated from biomass tables applied to forest inventory stand maps. Considering the root mean square error (RMSE) assessed with the inventory plots, the DRR, k-NN, and BioCLUST methods provided similar results, with average RMSE values of 59, 59, and 58, t/ha, respectively. Bias values were lowest for the k-NN methods followed by DRR, BioCLUST, and LCC (6, -8, 17, and 42 t/ha, respectively). Assessed with the baseline map, the BioCLUST method produced the lowest RMSE (41 t/ha) and bias (-4 t/ha) followed by the DRR and k-NN methods, with RMSE values of 47 and 54 t/ha and bias values of 9 and 23 t/ha, respectively. The method using biomass tables applied on the classified TM image (LCC) provided the greatest RMSE and bias, but may be suitable for applications that do not require a high level of precision. The BioCLUST and LCC methods provided practical advantages for the type of data sets available. Overall, the choice of a method rests on both the availability of data sets and the level of precision of the results required.

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MacKay, J.J., Becwar, M.R., Park, Y.S., Corderro, J.P., and Pullman, G.S. 2006. Genetic control of somatic embryogenesis initiation in loblolly pine and implications for breeding. *Tree Genetics & Genomes* **2**: 1–9.

Major advances have been achieved in somatic embryogenesis (SE) of loblolly pine, making it a promising method for the implementation of clonal forestry. However, the frequency of initiation of SE cultures, which is highly variable among loblolly pine families, needs improvement to further advance the implementation of this technology in conjunction with tree breeding. Genetic control of SE initiation was investigated using a diallel mating design with six parent trees. The results showed that SE initiation is under the control of strong genetic additive effects, as 42% of the total variance was explained by the variation due to general combining ability effects. The variation due to maternal effects explained a moderate proportion of the total variance, whereas other components of variance had small but significant effects. The conclusions regarding the strong genetic control of SE initiation were drawn from two independent experiments in which consistent results were obtained with seed from the same controlled pollinations but using entirely different procedures. Practical implications for breeding and clonal propagation were tested in independent experiments with targeted matings. Our results indicated that large improvement in SE culture initiation could be achieved in a predictable manner by selecting the most favorable female parent, or in some cases, a favorable male parent.

Mahendrappa, M.K., Pitt, C.M., Kingston, D.G.O., and Morehouse, T. 2006. Environmental impacts of harvesting white spruce on Prince Edward Island. *Biomass and Bioenergy* **30**: 363–369.

An increased trend toward whole-tree harvesting in the Maritimes region of Canada, followed by the planting of different tree species, highlighted a need to investigate the potential impacts of different harvesting methods on nutrient loss and the growth rates of different tree species planted in the treated areas. Thus, in 1990, a harvesting study with three main treatments was conducted in an old-field white spruce (*Picea glauca* (Moench) Voss) stand in Prince Edward Island, Canada. The treatments included whole-tree harvesting (WTH) with chain saws, in which almost all the aboveground biomass was removed from the site, stem-only (SO) harvest, consisting of chainsaw felling and removal of only the merchantable boles from the site, and control (CON), an uncut area. Glass-body lysimeters, connected to hanging-bottle vacuum generators, were installed at three depths to collect soil solution. The leachates collected over a 6-year period (1991–1997) were analyzed for pH and various anions and cations. Soil temperatures were also measured at three depths.

The hourly mean temperature immediately below the organic horizon in the WTH blocks was 8–10°C more than that in SO blocks. The daily mean temperature showed a similar pattern. Concentrations of nitrate and hydrogen ions were higher in the leachates collected from SO blocks. Ground vegetation recovered within 2 years following harvest and the calculated Shannon-Weiner biodiversity index showed no difference in index values among different treatments. The height growth of trees planted during May 1992 in the harvested blocks is greater in SO blocks than in WTH blocks. Planted eastern white pine (*Pinus strobus* L.) trees are generally taller than planted white spruce trees.

Ostaff, D.P., Piene, H., Quiring, D.T., Moreau, G., Farrell, J.C.G., and Scarr, T. 2006. Influence of pre-commercial thinning of balsam fir on defoliaton by the balsam fir sawfly. *Forest Ecology and Management* **223**: 342–348.

Pre-commercial thinning, whereby tree densities are reduced to diminish competition and maximize tree growth, is one of the most frequently used silvicultural practices in North America. We carried out field surveys in western Newfoundland and in eastern Nova Scotia, Canada, in pre-commercially thinned and unthinned stands of balsam fir (*Abies balsamea* (L.) Mill.) that had been defoliated by the balsam fir sawfly, *Neodiprion abietis* (Harr.), to determine if pre-commercial thinning increased the susceptibility of stands to insect defoliators. Except for stands sampled at the new and increasing stage of an outbreak, both egg densities of, and defoliation by, *N. abietis* were higher in thinned than unthinned stands. Higher levels of defoliation in thinned than unthinned stands were usually associated with higher levels of defoliation on intermediate-aged foliage. An estimate of tree vigor, used to predict future tree growth rate, was only weakly related to defoliation levels and it is, therefore, uncertain if higher defoliation in thinned stands would result in lower future growth rates than for trees in unthinned stands.

Ouimet, R., Arp, P.A., Watmough, S.A., Aherne, J., and DeMerchant, I. 2006. Determination and mapping critical loads of acidity and exceedances for upland forest soils in eastern Canada. *Water, Air, and Soil Pollution* **172**: 57–66.

Critical loads of acidity were estimated for upland forests in eastern Canada using the steady-state Simple Mass Balance (SMB) model. A consistent methodology was applied to the entire region, although critical loads were estimated separately for the Atlantic provinces (New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland), Quebec and Ontario using different data sources. In this project, critical load estimates and steady-state exceedance values did not include the effect of forest fire and forest harvesting, which could have a considerable impact on critical loads in eastern Canada. The observed soil pH – base saturation relationship for forest soils indicated that the constants used into the calculation of alkalinity leaching should be set to 10 (M/M) for the molar Bc/Al ratio in soil leachate and 10^9 (mol L^{-1})^2 for the gibbsite dissolution constant. The area-weighted median critical load for each province varied between 519 (Quebec) and 2063 eq $ha^{-1}y^{-1}$ (Prince Edward Island), with a median critical load value for eastern Canada of 559 eq ha^{-1} y^{-1}. It is estimated that approximately 52% of the mapped area is exceeded in terms of acidity according to the 1994–1998 average total (wet + dry) atmospheric deposition. Greatest exceedances occurred in Ontario and Quebec and in the south of Nova Scotia, due to low critical loads and high loads of acid deposition.

Ryall, K.L., and Fahrig, L. 2006. Response of predators to loss and fragmentation of prey habitat: a review of theory. *Ecology* **87**: 1086–1093.

Despite extensive empirical research and previous reviews, no clear patterns regarding the effects of habitat loss and fragmentation on predator–prey interactions have emerged. We suggest that this is because empirical researchers do not design their studies to test specific hypotheses arising from the theoretical literature. In fact, theoretical work is almost completely ignored by empirical researchers, perhaps because it may be inaccessible to them. The purpose of this paper is to review theoretical work on the effects of habitat loss and fragmentation on predator–prey interactions. We provide a summary of clear, testable theoretical predictions for empirical researchers. To test one or more of these predictions, an empiricist will need certain information on the predator and prey species of interest. This includes: (1) whether the predator is a specialist on one prey species or feeds on many kinds of prey (omnivore and generalist); (2) whether the predator is restricted to the same habitat type as the focal prey (specialist), can use a variety of habitats but has higher survival in the prey habitat (omnivore), or lives primarily outside of the focal prey's habitat (generalist); (3) whether prey-only patches have lower prey extinction rates than predator–prey patches; and (4) whether the prey emigrate at higher rates from predator–prey patches than from prey-only patches. Empiricists also need to be clear on whether they are testing a prediction about habitat loss or habitat fragmentation and need to conduct empirical studies at spatial scales appropriate for testing the theoretical prediction(s). We suggest that appropriate use of the theoretical predictions in future empirical research will resolve the apparent inconsistencies in the empirical literature on this topic.

Smith, G.A., and Hurley, J.E. 2006. First records in Atlantic Canada of *Spondylis upiformis* Mannerheim and *Xylotrechus sagittatus sagittatus* (Germar) (Coleoptera: Cerambycidae). *The Coleopterists Bulletin* **59**: 488.

Wang, B.S.P., and Simpson, J.D. 2006. Factors affecting tree seed storage. *Journal of Nanjing Forestry University* **30**: 1–8.

Seed storage is necessary to provide an annual supply of viable seed for reforestation and for preservation of germplasm for gene conservation. Seed longevity is inherited and varies among species. Five storage behaviors are recognized: orthodox, suborthodox, temperate, recalcitrant, tropical recalcitrant, and intermediate. Seed moisture content and storage temperature are the two most important factors contributing to storage behavior. Hermetically sealed containers are necessary for maintaining viability of orthodox and suborthodox seeds but some air exchange is required for recalcitrant seeds which remain metabolically active and require oxygen for respiration.

Zhang, S.Y., Chauret, G., Swift, D.E., and Duchesne, I. 2006. Effects of precommercial thinning on tree growth and lumber quality in a jack pine stand in New Brunswick, Canada. *Canadian Journal of Forest Research* **36**: 945–952.

A naturally regenerated jack pine (*Pinus banksiana* Lamb.) trial established in 1966 in New Brunswick was studied to determine how three precommercial thinning intensities (1.22 m x 1.22 m, 1.52 m x 1.52 m, and 2.13 m x 2.13 m) and a control (154 trees in total) affected tree growth and lumber quality. Mild (thinned to 1.22 m) and moderate (1.52 m) thinning had a modest impact on tree growth after 34 years (stand age 59). However, intensive thinning (2.13 m or 2212 stems/ha) increased tree height by 13.1% compared with the control, whereas tree diameter and merchantable stem volume per tree increased by >20% and >75%, respectively. Yields of No. 2 and Better increased slightly with increasing thinning intensity, but lumber bending properties decreased with increasing thinning intensity. There was, respectively, >20% and >15% difference in lumber strength (modulus of rupture) and stiffness (modulus of elasticity) between the mild (1.22 m) and intensive (2.13 m) thinnings. Intensive precommercial thinning (2.13 m) is recommended for increased volume growth, but rotation age (>59 years) should not be reduced if lumber bending properties are of concern.