RECENT PUBLICATIONS

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Journal Articles

Bourque, C.-P.-A., Cox, R.M., Allen, D.J., Arp, P.A., and Meng, F.-R. 2005. Spatial extent of winter thaw events in eastern North America: historical weather records in relation to yellow birch decline. *Global Change Biology* **11**: 1477–1492.

An algorithm (Weather Reader) was developed and used to analyze daily weather records from all existing Canadian and American weather stations of eastern North America (in excess of 2100 stations), from 1930 through 2000. Specifically, the Weather Reader was used to compile daily minimum, mean, and maximum air temperatures for weather stations with at least 30 years of data, and was used to calculate accumulated degree days for winter thaw–freeze events relelvant to yellow birch (*Betula alleghaniensis* Britt.) from beginning to end. A thaw–freeze event relevant to yellow birch was considered to take place when (i) the station daily maximum temperature reached or exceeded +4°C after being below freezing for at least 2 months of the winter, (ii) sufficient growing degree days accumulated (>50 growing degree days) to cause the affected yellow birch trees to prematurely deharden, and (iii) the daily minimum temperature dropped below -4°C causing roots and/or shoots of dehardened trees to experience freeze-induced injury and possibly dieback. The threshold temperature of +4°C represents the daily temperature above which biological activity occurs in yellow birch. The staiton growing degree day summaries were subsequently spatially interpolated with the Kriging function in GS+ and mapped in ArcView GIS in order to display the geographic extent of the most severe thaw–freeze events. The ArcView maps were then compared with the extent of historically observed yellow birch decline. It was found that the years 1936, 1944, and 1945 were particularly uncharacteristic in terms of region-wide winter thaw–freeze extremes, and also in terms of observed birch decline events during 1930–1960. An overlay of suspected accumulated birch decline based on thaw–freeze mapping and observed decline maps prepared by Braathe (1995), Auclair (1987, and Auclair *et al*. (1997) for 1930–1960 demonstrated similar geographic patterns. The thaw–freeze projection for 1930–1960 was shown to coincide with 83% of the birch decline map appearing in Braathe (1995) and 55% of the geographic range of yellow birch in eastern North America. Thaw–freeze mapping was also applied to two significant events in 1981. Greatest impact was recorded to occur mostly in southern Quebec and Ontario, and several American Great Lake States, specifically in northern Michigan and New York, where the greatest growing degree day accumulation prior to refreeze in late February (February 28th) was projected to have occurred; and in southern Quebec, most of Atlantic Canada, and Maine, prior to a late spring frost in mid-April (April 17).

Cameron, S.I., Smith, R.F., and Kierstead, K.E. 2005. Linking medicinal/nutraceutical products research with commercialization. *Pharmaceutical Biology* **43**: 425–433.

Thousands of bioactive phytochemicals have potential or established pharmaceutical, medicinal, or nutraeutical applications. Developing crops for bioactive compound extraction presents both research and development challenges and market-related considerations. Demonstrating that cultivation is economically viable is not sufficient. Using examples from both cultivated medicinals and our experience with *Taxus canadensis* Marsh., we discuss two types of market factors that must be considered before commercialization can proceed. Bioproduct market factors include availability of a cheaper product elsewhere from the same species; other species with the same bioactive compound; existence of a synthetic alternative to the naturally sourced phytochemical; the patent suite covering bioproduct extraction and use; commodification; and government bioresource regulation. The role and suitability of an industrial collaborator proposing to fund R&D activities also must be gauged by the marketplace; its capacity to sustain the proposed R&D funding; whether the intent is to market raw biomass or a value-added product; and how it is proposed to handle

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exclusivity and proprietary information. The economics of cultivating elite *T. canadensis* cultivars are also briefly summarized. It is concluded that consideration of bioproduct marketing realities can help to focus R&D goals and timelines based on both biomass cost reduction (or improvement in quality) and meeting the industrial collaborator's specific needs.

Leinekugel le Cocq, T., Quiring, D.T., Verrez, A., and Park, Y.S. 2005. Genetically based resistance of black spruce (*Picea mariana*) to the yellowheaded spruce sawfly (*Pikonema alaskensis*). *Forest Ecology and Management* **215**: 84–90.

We evaluated the effect of plant genotype on resistance of black spruce (*Picea mariana* (Mill.) B.S.P.) to the yellowheaded spruce sawfly (*Pikonema alaskensis* (Roh.)) in three half-sib family test sites and in a clonal seed orchard in New Brunswick, Canada. Heritability estimates were positively correlated to the percentage of trees defoliated by the sawfly in the half-sib family tests. At the site where the most damage occurred, the estimated individual heritability of resistance was 0.84, while that based on family means was 0.57. In the clonal seed orchard, the variability among clones explained 39.3% of the variation in defoliation, and individual clone heritability and clone mean heritability estimates were 0.40 and 0.82, respectively. Positive phenotypic and genetic correlations between tree height and damage suggest that selection for resistance may result in slightly slower tree height growth in some cases. These results suggest that there is good potential to select trees resistant to the sawfly that display other commercially desirable traits.

Mahendrappa, M.K. 2005. First Model Forest in India. *The Forestry Chronicle* **81**: 477–478.

Mankovska, B., Percy, K.E., and Karnosky, D.F. 2005. Impacts of greenhouse gases on epicuticular waxes of *Populus tremuloides* Michx.: results from an open-air exposure and a natural O_3 gradient. *Environmental Pollution* **137**: 580–586.

Epicuticular waxes of three trembling aspen (*Populus tremuloides* Michx.) clones differing in O_3 tolerance were examined over six growing seasons (1998–2003) at three bioindicator sites in the Lake States region of the USA and at FACTS II (Aspen FACE) site in Rhinelander, WI. Differences in epicuticular wax structure were determined by scanning electron microscopy and quantified by a coefficient of occlusion. Statistically significant increases in stomatal occlusion occurred for the three O_3 bioindicator sites, with the higher O^3 sites having the most affected stomata for all three clones as well as for all treatments including elevated CO_2, elevated O_3, and elevated C O_2 + O_3. We recorded statistically significant differences between aspen clones and between sampling period (spring, summer, fall). We found no statistically significant differences between treatments or aspen clones in stomatal frequency.

von Aderkas, P., Coulter, A., White, L., Wagner, R., Robb, J., Rise, M., Temmel, N., MacEacheron, I., Park, Y.S., and Bonga, J.M. 2005. Somatic embryogenesis via nodules in *Pinus strobus* L. and *Pinus banksiana* Lamb.—dead ends and new beginnings. *Propagation of Ornamental Plants* **5**: 3–13.

This study describes for the first time the development of mature somatic embryos of *Pinus strobus* L. and *Pinus banksiana* Lamb. from nodules. In the case of *P. strobus*, mature embryos derived from nodules were similar in morphology to mature zygotic embryos of the same species with the exception that root caps in the somatic embryos were reduced. In addition, somatic embryos of *P. strobus* from nodules were capable of germination. For *P. banksiana*, mature embryos from nodules often showed abnormalities including the usual absence of secretory cells, root meristems and root caps as well as the presence of tracheids, elongated cells and abundant intracellular spaces in the hypocotyls. Mature somatic embryos of *P. banksiana* from nodules initially formed during maturation were not capable of germination. Transferring cultures of both species from maturation medium back to proliferation medium induced reinitiation of embryogenesis. In the case of *P. banksiana*, placing mature embryos not capable of germination onto initiation medium resulted in the formation of secondary somatic embryos that developed normally and were capable of germination.

Information Reports

Nadeau, S., Beckley, T.M., and Short, R. 2005. The woodlot owners of Prince Edward Island: a survey of their forest use, management, and values. NRCan, CFS-AFC Information Report M-X-218E.

> Forests and woodland are integral to the natural scenery of Prince Edward Island (PEI). Some 16 000 private woodlot owners control 87% of PEI's forests, and have a major impact on the state of the forest resource. This report presents the results of a survey of PEI private woodlot owners that was conducted to elicit their beliefs, motivations, and attitudes, and to understand their role in forest management decisions. The survey was a collaborative effort of the PEI Department of Agriculture and Forestry, the University of New Brunswick, and Natural Resources Canada - Canadian Forest Service. It was sent to a sample of woodlot owners stratified according to three sizes of private woodlots: small (1–10 acres), medium (11–50 acres), and large (51 acres or more).

Yeates, L.D., Smith, R.F., Cameron, S.I., and Letourneau, J. 2005. Recommended procedures for rooting ground hemlock (*Taxus canadensis*) cuttings. NRCan, CFS-AFC Information Report M-X-219E.

> Methods for greenhouse propagation of rooted cuttings of Canada yew (*Taxus canadensis*) are described. Specific details on the collection and handling of cuttings, greenhouse culture, and post-rooting care of plants are provided. The equipment, facilities, and supplies required at all stages of production are listed. A brief description of ongoing research focusing on optimizing existing protocols for rooting dormant cuttings is also given.