ARBORICULTURAL ABSTRACTS

PLANT COMMUNITIES OF SELECTED URBANIZED AREAS OF HALIFAX, NOVA SCOTIA, CANADA

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This study was designed to compare plant biodiversity and community indicators among urban residential areas and more-natural habitats in the vicinity of Halifax, Nova Scotia. Six house lots were examined in each of three age categories of residential neighborhoods (>80 years, 30–50 years, and <10 years), and these were compared to four forested plots in semi-natural urban parks and four in a natural forest. The residential areas represented broad stages of successional development of "urban forest," while the stands of semi-natural and natural forest are representative of the original habitats that have been converted into residential land use. In general, the observed plant species richness was much higher in the residential areas, but these habitats were strongly dominated by non-indigenous species, whereas the natural and semi-natural habitats supported native taxa. This obvious difference between residential areas and semi-natural/natural habitats was confirmed by cluster analysis and principal components analysis, both of which separated the sample sites into two groups of plant communities. Neighborhood age and proximity of the residential sites had little influence on these multivariate analyses, suggesting that site-specific management practices (such as horticultural choices of landowners) had a strong influence on plant-community structure. Woody vegetation (trees and shrubs) in the semi-natural and natural forest had a higher basal area and stored more biomass and carbon than in residential habitats. However, there was a successional progression in the urban forest, in that older habitats stored much more woody carbon than younger ones. Although well-vegetated residential neighborhoods provide important environmental services, their striking dominance by exotic species, as well as their lower carbon storage in vegetation, contribute to an impoverishment of ecological integrity. This circumstance could be partially mitigated by changing horticultural management to encourage naturalization, particularly through the planting of indigenous species. (Landscape and Urban Planning 2004. 71(2–4):191–206)

DIFFERENTIAL SECTORIALITY IN LONG-DISTANCE TRANSPORT IN TEMPERATE TREE SPECIES: EVIDENCE FROM DYE FLOW, 15N TRANSPORT, AND VESSEL ELEMENT PITTING

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The capture of patchily distributed nutrients by tree roots has received extensive research, but the fate of those nutrients has not. We performed experiments to determine whether nutrient transport within tree species is preferentially transported from specific roots to specific branches. Saplings of five species with contrasting growth requirements were examined: two *Betula* species (*B. papyrifera* and *B. lenta*), *Populus tremuloides*, and two *Acer* species (*A. saccharum* and *A. rubrum*). To quantify patterns of long-distance transport, we examined the accumulation of safranin-O dye and 15N in branches when these tracers were applied to isolated lateral roots (dye and 15N) and to the main root system (15N). Because transport of nutrients between sectors requires flow through intervessel pit pairs of adjacent xylem vessel elements, we quantified the area of intervessel pits, the number of pits per unit vessel wall area, and the percentage of vessel wall area as pits in *Acer* and *Betula*. We found that the two *Betula* species were integrated (tracers applied to isolated roots were likely to accumulate in all branches), while *P. tremuloides* and the two *Acer* species were sectorial (tracer accumulation was more concentrated in particular branches). *Betula* had the largest number of intervessel pits per unit vessel wall area and the largest percentage of vessel wall area as pits. The high density of bordered pits may explain the ease of tracer movement throughout the two *Betula* species. Greater integration may allow certain trees (e.g., *Betula*) to exploit nutritionally patchy environments such as rocky soils and may alter plant–herbivore interactions. (Trees—Structure and Function 2004. 18(5):501–509)

NATURE IN THE RETAIL ENVIRONMENT: COMPARING CONSUMER AND BUSINESS RESPONSE TO URBAN FOREST CONDITIONS

Kathleen L. Wolf

Most research addressing public response to the urban forest has occurred in residential settings; little is known about consumer response to trees in retail places. This study evaluated

both potential shoppers' and business people's preferences and perceptions of trees in inner-city business districts. Trees are highly preferred by both groups, although business people express slightly lower liking for visual categories containing trees. Differences in attitudes regarding tree benefits and annoyances were found, with business people rating tree benefits significantly lower than shoppers. Research outcomes suggest best practices for urban forest planning and stewardship in neighborhood retail environments of large cities. (Landscape Journal 2004. 23(1):40–51)

POTENTIAL HAZARD CHARACTERISTICS OF *TILIA*, *BETULA*, AND *ACER* TREES REMOVED IN THE HELSINKI CITY AREA DURING 2001–2003

Minna Terho and Anna-Maija Hallaksela

To study decay and to improve the management and protection of old urban trees, a total of 256 felled urban trees were examined during 2001–2003: 95 *Tilia* spp., 74 *Betula* spp., and 87 *Acer* spp. Most of the trees (73%) were located in the main parks and along the main streets in the downtown area of Helsinki City, Finland. The mean age of the trees was over 60 years, and the majority (64%) were old park trees. Poor condition and increasing risk of failure were the main reasons for felling in 82% of the cases. Thirty-three percent of these trees were degenerated or dead, but the amenity value of 14% of the risk trees was still high. The latter were old, big trees that posed a potential hazard but had a vital and balanced crown. Some characteristic profiles for potential failure were identified for each of the tree species studied: *Ganoderma lipsiense* in the butts and hollows in the stems of *Tilia* spp., weak fork formations together with *Rigidoporus populinus* on *Acer* spp., and degeneration together with decay in the stem on *Betula* spp. Decay fungi most commonly identified were *R. populinus, G. lipsiense, Inonotus obliquus*, and *Piptoporus betulinus*. In addition, *Kretzschmaria deusta* was very common in three of the parks and on every one of the tree species investigated. (Urban Forestry and Urban Greening 2005. 3(2):113–120)

NITROGEN STORAGE AND ITS INTERACTION WITH CARBOHYDRATES OF YOUNG APPLE TREES IN RESPONSE TO NITROGEN SUPPLY

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Bench-grafted "Fuji/M.26" apple (*Malus domestica* Borkh.) trees received a constant nitrogen (N) supply (10.7 mM) from budbreak to the end of June, and were then fertigated with 0, 5, 10, 15 or 20 mM N in a modified Hoagland's solution for 2 months during the summer. In mid-October, half of the trees fertigated at each N concentration were sprayed twice with 3% urea, whereas the remaining trees served as controls. All trees were harvested after natural leaf fall and were stored at 2°C. Five trees from each of the N treatment combinations were destructively sampled during dormancy to determine the composition of N and total nonstructural carbohydrates (TNC). As the N supply from fertigation increased, amounts of N in both free amino acids and proteins increased, whereas C/N ratios decreased. Foliar urea applications in the fall significantly increased amounts of N in both free amino acids and proteins but decreased their C/N ratios. Arginine, the most abundant amino acid in both free amino acids and in proteins, accounted for an increasing proportion of N in free amino acids and proteins with increasing N supply from fertigation or foliar urea application. The ratio of protein N to free amino acid N decreased from about 27.1 to 3.2 as N supply from fertigation increased from 0 to 20 mM and decreased further to 3.0 in response to foliar urea applications in the fall. Concentrations of glucose, fructose, sucrose, and TNC decreased as the N supply from fertigation increased, whereas concentrations of sorbitol and starch remained relatively unchanged. Foliar urea applications decreased the concentration of each TNC component and the TNC concentration in each N fertigation treatment. A negative linear relationship was found between carbon in TNC and N in proteins and free amino acids. The sum of carbon in TNC, proteins, and free amino acids remained constant in response to N supply from fertigation. However, foliar urea applications decreased the sum of carbon in proteins, free amino acids, and TNC because about 21% of the decrease in TNC carbon was not recovered in free amino acids or proteins. Young apple trees store N and carbon dynamically in response to N supply. As N supply increases, an increasing proportion of N is found in the form of free amino acids, which have a low carbon cost, although proteins remain the main form of N storage. (Tree Physiology 2004. 24:91–98)

COMPARISON OF ESTABLISHMENT METHODS FOR EXTENSIVE GREEN ROOFS IN SOUTHERN SWEDEN

Tobias Emilsson and Kaj Rolf

The most common technique for establishment of extensive green roofs in Sweden has been using prefabricated vegetation mats. Our study investigated (1) how the establishment of green roofs in Sweden was influenced by the establishment method (prefabricated vegetation mat, plug-plant, shoot), substrate composition, and species mixture, and (2) whether on-site construction was a possible alternative. The establishment of the vegetation, which in all cases consisted of succulent species, was recorded using the quadrate point intercept method in fixed plots and the success measured as frequency cover. Prefabricated vegetation mats had higher succulent plant cover than on-site constructed roofs. There

was no difference in succulent plant cover between plots established using plug-plants compared to shoots. Shoot-established plots had more moss than the other establishment methods. The commercial substrate "roof soil" had significantly higher succulent plant cover than the other substrates, which might be related to a higher nutrient content. The organic content of the non-commercial substrates was rapidly decomposed. The standard species mixture produced a higher cover than both the mix developed for northern conditions and the mix with an increased proportion of big-leaved species. The total cover of the plots was mainly dependent on the cover of two species: *Sedum album* (L) and *S. acre* (L). Few species managed to establish spontaneously, but the establishment of woody species highlighted the need for proper maintenance. (Urban Forestry and Urban Greening 2005. 3(2):103–111)