

## ARBORICULTURAL ABSTRACTS

### **FORESTS IMPROVE QUALITIES AND VALUES OF LOCAL AREAS IN DENMARK**

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Afforestation can create multiple societal benefits. One fifth of the Danish municipalities plan to afforest in the next 5 years, among other reasons to attract new inhabitants. The attractiveness and values of afforested areas have been investigated in two independent Danish studies. In the first study, qualitative and quantitative surveys in two municipalities indicated that forests improved quality of life of the respondents. A short distance from the residence to the nearest forest usually resulted in a higher frequency of forest visits and a more positive view on the nature qualities of the local area in general, compared to respondents living further from forests. Proximity to nature, including forests, was furthermore mentioned as the most important reason for choice of their present home by 17% of the respondents. These results are supported by the second study in which house prices are used to elicit the residents' valuation of forested housing areas. By using the hedonic price method, house owners' willingness to pay for proximity to forests was found to be significant and positive and, in most circumstances, the aggregated value is expected to exceed the cost of afforestation. (Urban For. Urban Green. 2002. 1:97–106)

### **QUANTIFYING THE AESTHETIC BENEFITS OF URBAN FORESTRY**

**C. Price**

All the usual methods for valuing nonmarket benefits and costs may be applied to the aesthetic values of urban trees. However, evaluation has most usually been undertaken by one of two apparently dissimilar methods. The expert approach uses a mixture of measurement and judgment. Different versions of the approach have different quantitative input and produce divergent results, and theoretical justifications of their cash value are lacking. The hedonic approach attempts to derive cash values from house prices. Here, too, problems of quantification arise, in choice of appropriate variables, in the form of relationships and in interaction of variables. An approach using the human eye's ability to synthesize disparate variables may overcome these problems, but there remain problems of collinearity between environmental and demographic variables. At least explicit recognition of judgment in the process allows open discussion of these problems. (Urban For. Urban Green. 2003. 1:123–133)

### **A REVIEW OF THE BLACK COUNTRY URBAN FOREST MILLENNIUM PROGRAMME, 1995–2001**

**M. Johnston**

In 1995, the National Urban Forestry Unit (U.K.) obtained substantial funding from the Millennium Commission to expand an existing initiative called the Black Country Urban Forest (BCUF). Co-funding was also obtained from other sources. The BCUF Millennium Programme has been one of the most significant urban forestry initiatives in Britain over the past decade. The initiative was developed through the Black Country Environmental Partnership comprising local authorities and voluntary organizations. It involved the planting of hundreds of new woodlands, the rehabilitation of extensive areas of neglected woodland, and the planting of thousands of new street and garden trees. This paper is based on a detailed review of the initiative that analyzed its different elements, assessed their strengths and weaknesses, and determined what progress had been achieved. Now that the Millennium Programme has ended, some priorities for the future development of the BCUF are also identified. (Arboric. J. 2001. 26:111–139)

### **THE INFLUENCE OF DE-ICING SALTS ON GROWTH AND LEAF PHOTOCHEMISTRY OF SEVEN URBAN TREE SPECIES**

**G.C. Percival and A. Henderson**

Seven tree species (*Acer campestre*, *Betula pendula*, *Ilex aquifolium*, *Juglans regia*, *Quercus ilex*, *Prunus avium*, and *Sorbus aucuparia*) commonly planted into urban landscapes throughout the United Kingdom were subjected to foliar applied salt (NaCl). Chlorophyll fluorescence, photosynthetic rates, leaf chlorophyll content, and growth were used to assess short- and long-term tree responses. Recovery rates of foliar tissue from salinity damage did not markedly differ among species. Likewise, although reductions in tree growth were recorded for all species compared to controls at the cessation of the experiment, no mortalities were recorded. Results showed no major differences in foliar salt tolerance among the seven species tested. Use of chlorophyll fluorescence to monitor effects on the plastoquinone electron acceptor side reactions, pool size, and heterogeneity of photosystem II and absorption, trapping, and electron transport energy fluxes per cross section of photosystem II provided previously unreported effects of salinity on the leaf photosynthetic apparatus of the tree species used in this investigation. (Arboric. J. 2002. 26:23–41)

**PHOTOSYNTHETIC CHARACTERISTICS OF INVASIVE AND NONINVASIVE SPECIES OF RUBUS (ROSACEAE)****S.C.L. McDowell**

The prolific amount of growth and reproduction in invasive plants may be achieved by greater net photosynthesis and/or resource use efficiency. I tested the hypotheses that leaf-level photosynthetic capacity and resource-use efficiency were greater in two invasive species of *Rubus* as compared with two noninvasive species that have overlapping distributions in the U.S. Pacific Northwest. The invasive species had significantly higher photosynthetic capacity and maintained net photosynthesis ( $A$ ) over a longer period of the year than the noninvasive species. The construction cost ( $CC$ ) of leaf tissue per unit leaf mass was comparable among the four species, but the invasive species allocated less nitrogen ( $N$ ) per unit leaf mass. On a leaf area basis, both leaf  $CC$  and  $N$  were higher for the invasive species. The specific leaf area ( $SLA$ ) was also lower in the invasive species, indicating less photosynthetic area per gram leaf tissue. The invasive species achieved high  $A$  at lower resource investments than the noninvasive species, including having higher maximum photosynthetic rate ( $A_{max}$ ) per unit dark respiration ( $R_d$ ), greater  $A_{max}$  per unit leaf  $N$  (photosynthetic nitrogen-use efficiency), and greater water-use efficiency as measured by instantaneous rates of  $A$  per unit transpiration ( $A/E$ ) and by integrated  $A/E$  inferred from stable carbon isotope ratios ( $\delta^{13}C$ ). Using discriminant analysis, these photosynthetic characteristics were found to be powerful in distinguishing between the invasive and noninvasive *Rubus*.  $A_{max}$  and  $A/E$  were identified as the most useful variables for distinguishing between the species, and therefore, may be important factors contributing to the success of these invasive species. (Am. J. Bot. 2002. 89(9):1431–1438)

**THE TRACHEID-VESSEL ELEMENT TRANSITION IN ANGIOSPERMS INVOLVES MULTIPLE INDEPENDENT FEATURES: CLADISTIC CONSEQUENCES****S. Carlquist and E.L. Schneider**

Current definitions of tracheids and vessel elements are overly simple. These definitions are based on light microscope studies and have not incorporated information gained with scanning electron microscopy (SEM) or transmission electron microscopy (TEM). Current definitions are based primarily on angiosperms, especially eudicots, and were devised before many basal angiosperms were carefully studied. When all sources of information are taken into account, one can recognize changes in six characters in the evolution of tracheids into vessel elements in angiosperms (or vice versa) as well as in other groups of vascular plants. There is an appreciable number of taxa in which all criteria for vessel origin are not met, and thus incipient vessels are present. At the very least, vessel presence or absence should not be treated as a single binary character state change in construction of cladistic matrices. Increase in conductive area of an end wall by means of lysis of progressively greater areas of pit membrane and increase in pit area on the end wall (as compared to pit area on equivalent portions of lateral walls) are considered the most important usable criteria for recognizing intermediacy between tracheids and vessel elements. Primitive character states in vessel elements are briefly discussed to differentiate them from changes in character states that can be regarded as intermediate between tracheids and vessel elements. (Am. J. Bot. 2002. 89(2):185–195)