ARBORICULTURAL ABSTRACTS

LIGHT AND ATMOSPHERIC POLLUTION AFFECT PHOTOSYNTHESIS OF STREET TREES IN URBAN ENVIRONMENTS

M. Takagi and K. Gyokusen

The gas exchange of leaves of the *Ilex rotunda* trees planted at 13 sites in the city of Fukuoka, Japan, with various sun light conditions and air pollutant concentrations was studied. The highest maximum photosynthetic rate and the stomatal conductance of single leaves were measured under controlled conditions and analyzed with the environmental variables by correlation analysis. The photosynthetic rate of the urban core was highest and that of the suburban area was lowest. The results from the correlation analysis showed that the photosynthetic rate was negatively correlated with sunlight conditions and positively correlated with air pollutant concentrations. The reasons for the higher photosynthetic rate in the urban core with poor sunlight conditions and higher air pollutant concentrations were discussed in relation to stimulation by air pollutants and avoidance of photoinhibition. (Urban For. Urban Green. 2004. 2(3):167–171)

GROWTH OF SEVERAL TREE SPP. IN CONTAINERS IN RESPONSE TO N LOADING, FERTILIZER TYPE, AND SUBSTRATE

D.K. Struve

Two studies were conducted to determine if Comtil, a composted municipal sewage sludge, could be used as a substrate component and a slow-release N source in a containerized whip production system and to determine the growth potential of nine tree species not widely grown in the industry. Also, in the second study the effects of fertilizer type on five oak species were studied. In the first study, total N from Comtil was estimated to be 64 g per No. 3 nursery container, representing between 48% and 100% of the N loading. Despite the potential high N loading from Comtil, tree height was unaffected. No simple fertilizer treatment consistently produced the tallest plants for the four species studied. Fertilizer type affect growth of only two species (*Quercus macrocarpa* and *Q. muehlenbergii*) and then only in the first year of the two year study. There were significant differences in height growth among the six *Q. alba* sources. The nine tree species in this study could be grown in 3:1 (by volume) pine bark:coir and pine bark:Comtil substrates. (Environ. Hortic. 2002. 20(3):133–137)

ADAPTING SILVICULTURAL MANAGEMENT SYSTEMS TO URBAN FORESTS

K. van Gadow

An important objective of forest science today is to better serve the cultural and recreational needs of a growing urban population. Forests are complex open systems with multiple functions, and, to maintain credibility among the public, people in charge of the management of urban forests need to draw on the expertise of a variety of scientific disciplines—not only the humanities but increasingly also the forest engineering and forest biological sciences. The multidisciplinary character of forest research can be utilized to achieve a more effective interface between science and politics. (Urban For. Urban Green. 2002. 1(2):107–113)

IMPROVED ESTIMATES OF TREE SHADE EFFECTS ON RESIDENTIAL ENERGY USE

J.R. Simpson

Tree shade alters building cooling and heating loads by reducing incident solar radiation. Estimates of the magnitude of his effect, and how it is influenced by urban forest structure (e.g., tree size and location), are difficult due to the complexity inherent in tree–sun–building interactions. The objective of this paper is to present a simplified method for making these estimates appropriate for neighborhood and larger sales. The method uses tabulated energy use changes for a range of tree types (e.g., size, shape) and locations around buildings (lookup tables), combined with frequency of occurrence of trees at those locations. The method was tested by comparison to detailed simulations of 178 residences. The method lends itself to practical evaluation of these shading effects at neighborhood or larger scales, which is important for regional assessments of tree effects on energy use and for development of tree selection and siting recommendations for proposed energy conserving planting programs. (Energy Build. 2002. 34:1067–1076)

ETIOLOGY OF BRONZE LEAF DISEASE OF *POPULUS*

J.A. Smith, R.A. Blanchette, M.E. Ostry, and N.A. Anderson

Bronze leaf disease is a potentially destructive disorder of the *Populus* section of the genus *Populus*. The causal agent has been reported to be *Apioplagiostoma populi* (anamorph: *Discula* spp.). Based on etiological and symptomological studies, field observations of symptom development suggest that the pathogen moves systemically in the host. This was verified by graft experiments where symptoms progressed from the scion into the elongating stem. A bronze-pigmented vascular discoloration was observed in symptomatic leaves and branches. Dieback of affected stems also was common. Spore-trap studies elucidated the timing and necessary weather conditions of *A. populi* ascospore dispersal in relation to infection and symptom development. Exposure-tree experiments revealed that ascospores of *A. populi* are the primary inoculum and resulting infection causes distinctive disease symptoms on affected trees. Perithecia of *A. populi* were observed on overwintered symptomatic leaves but were not observed on asymptomatic leaves. Acervular conidiomata were observed on symptomatic leaves during August and September. Although *A. populi* ascospores germinated in vitro, *A. populi* was not recovered from symptomatic tissue. Isolations from diseased leaves consistently yielded *Epicoccum nigrum*, but the role of this species is unclear. Inoculations of susceptible plants with *E. nigrum* conidia failed to reproduce symptoms, but inoculations with ascospores of *A. populi* produced symptoms typical of bronze leaf disease and Koch's postulates were performed. (Plant Dis. 2002. 86:462–469)

TREE MORTALITY RATES AND TREE POPULATION PROJECTIONS IN BALTIMORE, MARYLAND, USA

D.J. Nowak, M. Kuroda, and D.E. Crane

Based on re-measurements (1999 and 2001) of randomly distributed permanent plots within the city boundaries of Baltimore, Maryland, trees are estimated to have an annual mortality rate of 6.6% with an overall annual net change in the number of live trees of –4.2%. Tree mortality rates were significantly different based on tree size, condition, species, and land use. *Morus alba, Ailanthus altissima*, and trees in small diameter classes, poor condition, or in transportation or commercial–industrial land uses exhibited relatively high mortality rates. Trees in medium- to low-density residential areas exhibited low mortality rates. The high mortality rate for *A. altissima* is an artifact of this species distribution among land use types (24% were in the transportation land use). Based on a new tree population projection model that incorporates Baltimore's existing tree population and annual mortality estimates, along with estimates of annual tree growth, Baltimore's urban forest is projected to decline in both number of trees and canopy area over the next century. Factors affecting urban tree mortality are discussed. (Urban For. Urban Green. 2004. 2(3):139–147)