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Appraisal of Key Abiotic Parameters Affecting Street Tree Growth..... 1

Abstract. Street trees must cope with severe environmental conditions. Identification of factors that modulate their survival and growth is a key process for successful management. To estimate these factors, contingency analyses were carried out using abiotic data collected locally for Norway maple (*Acer platanoides* L.), silver maple (*Acer saccharinum* L.), hackberry (*Celtis occidentalis* L.), green ash (*Fraxinus pennsylvanica* Marsh.), honeylocust (*Gleditsia triacanthos* L.), littleleaf linden (*Tilia cordata* Mill.), and Siberian elm (*Ulmus pumila* L.) trees. Also, comparable analyses were performed on a merged all-species data set. Whereas sharp differential growth was found between commercial zones and residential areas, studied species demonstrated ecological tolerance as individuals were found normally or vigorously growing in severe conditions. In this situation, ample irradiation intensity might be an important factor contributing to urban tree growth. Statistical analyses led to the identification of a threshold level (80% of total potential irradiation) above which optimal growth was found in commercial zones. Research results also brought out the importance of the underlying surficial deposits: slow growth rates were linked to the presence of sand/gravel deposits. Finally, higher soil de-icing salt concentrations were found in tree pits where trees were transplanted closer to the curb and on wider streets.

Key Words. Compaction; Contingency Analysis; De-icing Salt Effect; Light Irradiation; Street Trees; Surficial Deposit; Urban Zone Type.

Karen Smith, Peter May, and Robert White

Above and Belowground Growth of *Corymbia maculata* in a Constructed Soil: The Effect of Profile Design and Organic Amendment..... 11

Abstract. Spotted gum (*Corymbia maculata* (Hook.) K.D. Hill & L.A.S. Johnson), a common street tree in southern Australian cities, was used to assess growth responses to variations in profile design and organic amendment of constructed soils. Aboveground growth responses were total stem dry weight and foliar nutrient content. The belowground response was root length density. Soil profiles were constructed of sand, amended with either coir fiber, composted biosolids or composted green waste, at rates of 0, 5, 10 or 20% by volume. The profiles were either layered, with a 150 mm (6 in) organic-amended surface layer, or uniform, with amendment of the entire profile. A single fertilizer treatment was applied to all profiles. Shoot dry weight was only affected by organic matter type with the greatest growth in sand amended with composted biosolids. Foliage P and K content were affected by amendment but foliage N was not. Profile design affected root length density and distribution. Trees in uniform profiles had greater root length density, and a more uniform distribution of roots, especially with compost amendments. Above- and belowground growth increases are thought to be due to increased nutrient status resulting from organic matter mineralization.

Key Words. Biosolids; Coir Fiber; Compost; Designed Soils; Root Density; Soil Amendment.

Robert N. Muller and Carol Bornstein

Maintaining the Diversity of California's Municipal Forests 18

Abstract. Policies to promote urban forest diversity were assessed in 49 California, U.S. municipalities through a short questionnaire, followed by evaluation of street tree inventories and approved planting lists. While the majority of respondents (82%) indicated maintaining species diversity was an objective in managing their municipal forest, fewer than half of those responding positively (48%) had codified the objective in an actual urban forest management plan. Protecting against invasive species was an objective for a minority of communities (24%). Street tree inventories, provided by 18 respondents, indicated a high existing diversity within the communities of the state of California (avg. 185 species per community; range 95–408). In communities where both inventories and approved planting lists could be compared directly, the number of approved species for future planting was 29% of the number of species in the existing inventory. This suggests that the future diversity of California's urban forests may be at risk. In order to improve diversity of their municipal forests, it is suggested communities retain an experimental approach to evaluating new species, build productive collaborations with all stakeholders as well as other communities, and develop outreach opportunities to enhance public awareness of the multiple values of a diverse urban forest.

Key Words. California; Diversity; Invasive Species; Municipal Forest; Urban Forest.

Ryan A. Blaedow and Jennifer Juzwik

Spatial and Temporal Distribution of *Ceratocystis fagacearum* in Roots and Root Grafts of Oak Wilt Affected Red Oaks 28

Abstract. The spatial and temporal distributions of the oak wilt fungus, *Ceratocystis fagacearum*, in the roots of symptomatic and adjacent asymptomatic northern red oaks (*Quercus rubra*) were investigated. Root systems of 12 pairs of such trees were exposed to 1 m (3.3 ft) depth using an air excavation tool. In only one case was the fungus found in more than two cardinal directions of symptomatic trees based on isolation attempts from 192 root segments excised from 1.2 m (3.5 ft) lengths of primary roots extending in four cardinal directions from the root collar. Many (162) self grafts occurred in all oaks. Few (13) inter-tree grafts were found in less than one-third of the tree pairs. The fungus was isolated from the roots involved in two of thirteen inter-tree grafts and 14 of 62 self grafts assayed. The sporadic and unpredictable distribution of the fungus in roots of wilting red oaks supports current control approaches that assume the fungus is present in roots extending out in all directions once crown symptoms are evident. Additionally, self grafts may serve as a conduit for circumferential movement of the fungus around the main stem, but outside the root collar, through the interconnected roots.

Key Words. *Ceratocystis fagacearum*; Oak Wilt; *Quercus rubra*; Root Grafts; Vascular Wilt Disease.

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Growth of Newly Established *Tilia platyphyllos* 'Rubra' Roadside Trees in Response to Weed Control and Pruning 35

Abstract. This tree establishment study investigates the effect of weed control and pruning treatments on stem and branch diameter increment of newly planted broad-leaved lime (*Tilia platyphyllos* 'Rubra') roadside trees. Weed control significantly increased stem circumference four years after establishment by 3.6 cm (1.4 in) from 24.5 cm (9.7 in, untreated control) to 28.1 cm (11.1 in). In terms of Danish nursery sales prices, this corresponds to an increase of tree cash value of 1201 DKK (160.90 €, 235.40 US\$) per tree. Calculating with 400 DKK (53.60 €, 78.40 US\$) as cost for contract weeding per hour, this corresponds to 0.75 hours per tree per year for a period of four years.

In addition to weed control treatments, trees were pruned at establishment, two years after establishment, or at both times. None of the pruning treatments affected stem diameter growth, but branch diameter and branch:stem diameter ratio were significantly reduced by all pruning treatments. Branch diameter ranged from 40.1 mm (1.6 in) on unpruned trees to 34.6 mm (1.4 in) on trees pruned both times. Branch:stem diameter ratio ranged from 0.54 on unpruned trees to 0.49 on trees pruned both times.

In consequence, weed control is recommended as a strong management practice. Mild pruning is also considered advisable, if structural crown problems can be avoided at an early stage, and if the tree has to be prepared for later pruning operations.

Key Words. Branch Diameter Growth; Branch:Stem Ratio; Establishment Care; Linden; Stem Diameter Growth; Transplanting; Tree Valuation.

Glynn C. Percival

Effect of Systemic Inducing Resistance and Biostimulant Materials on Apple Scab Using a Detached Leaf Bioassay 41

Abstract. A detached leaf bioassay was used to evaluate several systemic inducing resistance agents, a range of biostimulant products and a conventional triazole fungicide (myclobutanil) on apple scab (*Venturia inaequalis*) development under laboratory conditions. None of the biostimulant products (seaweed extract, betaine, molasses, humic acid, yucca extract, and plant hormone/vitamin complex) evaluated in this study inhibited germination of apple scab conidia, subsequent formation of appressoria or reduced leaf scab severity compared to water treated controls. All SIR agents used in this investigation (potassium phosphonate, potassium phosphite, harpin protein, salicylic acid, salicylic acid derivative) inhibited germination of apple scab conidia, subsequent formation of appressoria and reduced leaf scab severity. The synthetic fungicide myclobutanil resulted in the greatest levels of germination inhibition, reduced appressorium development and leaf scab severity. Results suggest application of an appropriate SIR product may provide a useful addition to existing methods of apple scab management; however, use of biostimulants as scab protectant compounds appears limited.

Key Words. Fungicides; Integrated Disease Management; Pathogen Control; Plant Health Care; Urban Landscapes.

Contrasting Ohio Nursery Stock Availability with Community Planting Needs..... 47

Abstract. There has been a continuing disparity between what urban foresters say they request for community plantings and the stock availability from nurseries. To investigate this, twenty-two of Ohio's urban foresters were surveyed in February 2008 to contrast their planting needs with nursery stock availability. Urban foresters reported planting more than 9,000 trees in 2005 and expected to plant more than 15,000 trees in their respective communities in 2010. At the same time, nearly 278,000 trees [5 cm (2 in)] were reported as being available for sale by nurseries participating in the 2008 Ohio Nursery Stock Survey. The results suggested that maples, crabapples, many hawthorns, and pears generally were present in nurseries in excess of the quantities desired by urban foresters. Conversely many legumes, oaks, elms, lilacs and lindens were lacking in availability. Several other species were somewhat balanced in terms of urban foresters' requests and nursery production. Ohio, U.S. has been dealing with the impacts of the emerald ash borer on *Fraxinus* species. Increasing taxonomic diversity can be a relatively low cost means of insuring against the possible introduction of another exotic pest that might attack another genus (such as *Acer*) and requires increased availability of some species currently lacking in availability in the nursery supply chain.

Key Words. *Acer*; Community Planting; *Crataegus*; *Fraxinus*; *Gleditsial*; *Malus*; Nursery Stock Availability; *Pyrus*; *Quercus*; *Tilia*; *Ulmus*.
