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James L. Sherald

**Bacterial Leaf Scorch of Landscape Trees:  
What We Know and What We Do Not Know ..... 376**

**Abstract.** *Xylella fastidiosa* has been recognized as a pathogen of landscape trees for over 25 years. Collectively, these diseases are referred to as bacterial leaf scorch (BLS). Arborists, property owners, and communities are now beginning to recognize BLS as a serious threat to the urban forest. Although advances in symptom awareness and diagnostic techniques have enabled arborists to diagnose BLS, there are many questions regarding host range, transmission, pathogenesis, disease management, and individual tree therapy that remain unanswered.

**Key Words.** Alternative Hosts; BLS; Leafhoppers; Pierce's Disease; *Xylella fastidiosa*.

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Francesco Ferrini and Manuela Baietto

**Effect of Compost-amended Backfill and Paved Surface  
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**Abstract.** We compared the effects of compost-amended backfill and of the size of the exposed surface area on Norway maple (*Acer platanoides* L.) trees planted in a high-quality backfill on a brownfield area previously occupied by a truck factory. After 3 years, trees with larger and mulched planting areas had higher leaf gas exchange, leaf chlorophyll, and mineral content than those grown under pavement. The effects of the different quantities of compost in the backfill were more difficult to assess within the framework of this study. Although these effects may become significant in the long term, it is difficult to prescribe compost addition as a useful technique to improve plant growth and physiology when the native soil has been completely replaced by good topsoil.

**Key Words.** Chlorophyll; Compost; Leaf Mineral Content; Mulching; Photosynthesis; Tree Establishment.

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Steven Frank, Robert Ahern, and Michael J. Raupp

**Does Imidacloprid Reduce Defoliation by  
Japanese Beetles on Linden for More Than One Growing Season? ..... 392**

**Abstract.** Laboratory feeding trials confirmed that leaves from little-leaf linden treated with imidacloprid were eaten by Japanese beetles far less than those from untreated trees. Field studies revealed that soil applications of imidacloprid significantly reduced the degree of severe defoliation caused by Japanese beetles in the year that the insecticide was applied and also in the next year. These findings indicate that imidacloprid is a useful tool for arborists in reducing defoliation by this important pest.

**Key Words.** Defoliation; Feeding Deterrence; Imidacloprid; IPM; Japanese Beetle; Linden; Plant Health Care.

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Glynn C. Percival and Ali Mohammed Salim AlBalushi

**Paclobutrazol-induced Drought Tolerance in Containerized English and Evergreen Oak ..... 397**

**Abstract.** The influence of paclobutrazol (PBZ) applied as a foliar spray and root drench on drought tolerance and recovery from drought, of containerized English and evergreen oak was investigated. PBZ treatment induced a suite of physiological adaptations that would allow both species to tolerate drought; more specifically, increased total leaf content of carotenoids (lutein:-carotene:neoxanthin:-carotene) and xanthophylls (zeaxanthin:antheraxanthin:violaxanthin), chlorophylls, proline, superoxide dismutase, and catalase. In addition, PBZ strengthened leaf membrane integrity and increased leaf photosynthetic efficiency and light-induced CO<sub>2</sub> fixation before and at the cessation of the drought treatment. Irrespective of species, recovery rates of droughted trees treated with PBZ were 20% to 50% higher than non-PBZ-treated trees. In all cases, control trees (non-PBZ-treated) had the least capacity for recovery. Application of some of the PBZ treatments induced overregulation of newly emerged leaves. Results of this investigation indicate applications of the growth inhibitor PBZ either as a foliar spray or root drench induce a suite of physiological adaptations that confer a useful degree of drought tolerance and aid in the recovery from drought-induced damage. It is suggested that PBZ-induced protection of both English and evergreen oak from damage caused by drought stress is mediated by increased antioxidant enzyme and pigment activities.

**Key Words.** Carotenoids; Chlorophyll Fluorescence; Chlorophylls; Electrolyte Leakage; Growth Inhibitor; Proline; *Q. Ilex*; *Quercus robur*; Stress Enzymes; Transplanting.

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Paolo Gonthier and Giovanni Nicolotti

**A Field Key to Identify Common Wood Decay Fungal Species on Standing Trees ..... 410**

**Abstract.** A field key to species is presented for the most important and widespread European wood-rotting basidiomycetes on standing trees. Sixty-four fungal taxa belonging to 36 genera and 17 families of Agaricales, Hymenochaetales, Polyporales, and Russulales are included in the key, which was mostly based on macroscopic features of the basidiomata. The key was validated in the field and allowed for easy recognition of wood decay fungi.

**Key Words.** Basidiocarp; Basidiomata; Diagnosis; Field Guide; Simplified Key.

Chelcy R. Ford, James M. Vose, Michael Daley, and Nathan Phillips

**Use of Water by Eastern Hemlock: Implications for Systemic Insecticide Application ..... 421**

**Abstract.** The hemlock woolly adelgid (HWA; *Adelges tsugae* Annand) is causing widespread decline and mortality of eastern hemlock (*Tsuga canadensis* (L.) Carr.) throughout most of the range of eastern hemlock. Stem injection of insecticide is widely used as a chemical control measure, but the effectiveness of this method depends on the hydraulic characteristics of individual trees. We present data quantifying the distribution of water flux within the stems and the seasonal variability of daily water use of eastern hemlock trees growing in New England, U.S. and the southern Appalachians. We provide simple mathematical and graphical models derived from these data that can be used by landowners, natural resource managers, and tree care specialists to estimate the amount and timing of water use by eastern hemlock based on tree size and climatic conditions. We anticipate that the data and models presented will be useful in improving the effectiveness and efficiency of systemic insecticide applications.

**Key Words.** *Adelges tsugae*; Hemlock; Imidacloprid; Insecticide; Systemic; Transpiration; *Tsuga* spp.; Water Use.

William Hascher and Christina E. Wells

**Effects of Soil Decomposition and Amendment on Root Growth and Architecture in Red Maple (*Acer rubrum*) ..... 428**

**Abstract.** The Terravent™ soil injection device (Pinnacle Concepts, Ltd., Cornwall, UK) uses compressed nitrogen gas to fracture compacted soil and permits the subsequent injection of liquid amendments. In the current study, we measured fine root growth and architecture in soil that had received one of four treatments: 1) Terravent injections, 2) Terravent injections followed by liquid amendment (MycorTree® Injectable; PHC, Inc., Pittsburgh, PA, U.S.), 3) addition of amendment only, and 4) an untreated control. The experiment was conducted on ten red maples (*Acer rubrum*) growing on a moderately compacted urban clay soil next to a busy road on the Clemson University campus. Treatments were applied in April 2002. Seven weeks later, soil cores were pulled from locations adjacent to the injection sites, and fine roots (less than 2 mm [0.08 in] in diameter) from each core were washed free of soil. A variety of root parameters were measured, including length, surface area, diameter distribution, and mass. Terravent treatment had no effect on any root parameters measured. Application of MycorTree was associated with small, statistically significant reductions in root diameter, root mass density (mg root/cm<sup>3</sup> soil), and root surface area density (cm<sup>2</sup> root/cm<sup>3</sup> soil).

**Key Words.** *Acer rubrum*; Root Growth; Soil Decomposition.

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