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**Abstract.** Paclobutrazol (PBZ)(0 g L<sup>-1</sup>, 0.125 g L<sup>-1</sup>, and 0.25 g L<sup>-1</sup>) and potassium nitrate (KNO<sub>3</sub>)(0 g tree<sup>-1</sup>, 100 g tree<sup>-1</sup>, and 200 g tree<sup>-1</sup>) were tested on a landscape tree, *Xanthostemon chrysanthus* (F. Muell.) Benth., in an attempt to enhance its stress tolerance under harsh urban conditions. Significant effects on tree height, diameter at breast height, canopy diameter, leaf area, and anatomy of tree leaves and stems in response to PBZ and KNO<sub>3</sub> have been previously reported; in addition to these, the influences on leaf thickness and leaf physiology, including chlorophyll content and gas exchange, are discussed in this study. Relative chlorophyll content was significantly increased with PBZ and/or KNO<sub>3</sub>, enhancing leaf greenness. Increased leaf thickness of up to 13.37% at 6 months after treatment with a combination of PBZ and KNO<sub>3</sub> was observed. The presence of PBZ significantly reduced the photosynthetic and transpiration rates and stomatal conductance. Reduced leaf physiological traits combined with thicker leaves would be beneficial for trees to tolerate harsh urban settings. Therefore, a combination of PBZ and KNO<sub>3</sub> is recommended for stress tolerance enhancement of *X. chrysanthus* grown as a landscape tree.

**Keywords.** Golden Penda; Leaf Physiology; Photosynthesis; Plant Growth Regulator; Urban Tree.

Kevin D. Chase, Elden LeBrun, and Chad M. Rigsby  
**Efficacy of Flupyradifurone, Pyriproxyfen and Horticultural Oil, and Dinotefuran Against Gloomy Scale (*Melanaspis tenebricosa* Comstock)..... 64**

**Abstract.** Gloomy scale (GS)(*Melanaspis tenebricosa*) is a major pest of red maple (*Acer rubrum*) across much of the eastern USA. Current pesticide recommendations for GS management are efficacious when applications are made at the appropriate time. However, appropriate timing may not always be possible. For instance, the tree owner may not contact pest management professionals in time to make timely applications. We established a field trial to determine the efficacy of the pesticides pyriproxyfen plus horticultural oil and dinotefuran, as well as a relatively new pesticide available in the ornamental woody plant market, flupyradifurone, against GS. There were three primary goals of this study: (1) to quantitatively compare the effectiveness of pyriproxyfen plus horticultural oil and dinotefuran; (2) to compare flupyradifurone with these two generally recommended treatments; and (3) to assess whether flupyradifurone is effective when applications are made later in the summer. We found that pyriproxyfen plus horticultural oil, dinotefuran, and flupyradifurone applications made during the active crawler period were equally efficacious, statistically, and that flupyradifurone treatments applied later in the summer were not statistically differentiable from untreated controls. While these pesticide applications are effective at suppressing GS populations, plant health care tactics aimed at preventing outbreaks should be prioritized and incorporated into the complete pest management strategy.

**Keywords.** Armored Scale; Pesticide Trial; Urban Trees.

Lai Fern Genevieve Ow and Dloysius Chow  
**Urban Stormwater Management: Can Tree Roots and Structural Soils Improve Hydraulic Conductivity into Compacted Soils? ..... 72**

**Abstract.** Typically, surface precipitation runoff is a key source of flooding and water pollution in urban communities, and the costly and time-consuming process of installing bio-retention basins is one approach to overcoming these challenges. The implementation of structural soils in bio-retention basins designed to receive and retain stormwater provides these systems with additional functions to bear loads and facilitate tree root growth and exploration. The channels that tree roots produce as they grow can also aid in the flow of water down the soil profile. In this study, the potential for tree roots to penetrate compacted soils and increase rates of hydraulic conductivity were examined alongside the use of structural soil in the context of urban stormwater systems. For the first experiment, *Pouteria obovata* and *Calophyllum soulattri* together with a control (without tree) were placed in cylindrical planting sleeves surrounded by compacted clay loam at two compaction levels (bulk

densities of 1.45 g cm<sup>-3</sup> and 1.66 g cm<sup>-3</sup>). Roots of both species penetrated the compacted soil, and hydraulic conductivity was increased by an average of 50%. In the second experiment, the same species were grown in structural soil, and a geotextile separated the compacted soil (bulk density of 1.66 g cm<sup>-3</sup>) from the structural soil (compacted). A greater number of roots as well as larger root diameters from *Pouteria obovata* penetrated the geotextile, and hydraulic conductivity was enhanced twofold when compared to the controls that had no trees. Growing woody rooting plants and installing structural soils within urban stormwater systems may confer benefits of increased water infiltration and enhanced root development, alongside potential overall improvements to tree health for stormwater control systems in urban environments.

**Keywords.** Hydraulic Conductivity; Root Penetration; Soil Compaction; Structural Soil; Urban Stormwater Systems.

Glynn C. Percival and Sean Graham

**Evaluation of Inducing Agents and Synthetic Fungicide Combinations for Management of Foliar Pathogens of Urban Trees ..... 85**



**Abstract.** Unmanaged, foliar pathogens of urban trees can be detrimental to tree health and aesthetics. Overreliance on synthetic fungicides increasingly means alternative means of pathogen management are now required. The purpose of these studies was to investigate the efficacy of 3 commercially available agents, harpin protein, salicylic acid derivative, and liquid chitosan, which can initiate induced resistance (IR) in plants. IR agents were applied independently and in combination with a synthetic fungicide (boscalid + pyraclostrobin) against 2 foliar pathogens (*Venturia pirina* and *Guignardia aesculi*) under field conditions with *Pyrus communis* ‘Williams’ Bon Chrétien’ and horse chestnut (*Aesculus hippocastanum*) acting as tree hosts. These agents were tested over 3 consecutive years. In 4 of 5 field studies, the use of an IR agent alone reduced pathogen symptom severity, increased fruit/seed yield, and enhanced leaf chlorophyll content. In virtually all studies, application of boscalid + pyraclostrobin at 2/3 strength plus an IR agent provided the same degree of pathogen control as boscalid + pyraclostrobin at full strength. Application of boscalid + pyraclostrobin at 1/3 strength plus an IR agent provided a reasonable degree of foliar pathogen control. Results showed that a combined mix of an IR agent with a 1/3 reduced dose of boscalid + pyraclostrobin was as effective at reducing symptom severity of 2 foliar pathogens as boscalid + pyraclostrobin applied at full strength, provided at least 4 sprays were applied during a growing season.

**Keywords.** Fungicides; *Guignardia*; Orchard Management; Pathogen Control; Plant Health Care; Synergism; Urban Landscapes; *Venturia*.