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**Abstract.** Background: Phosphite products have a history of use as fertilizers and fungicides. In contrast to conventional fungicides, phosphites work both directly and indirectly by activating plant defense mechanisms and are proven to be effective against *Phytophthora* root rot and canker diseases. There are numerous phosphite products on the market labeled as fungicides or fertilizers, but comparative studies on their efficacy and duration of impact are scarce. Methods: We compared the efficacy of commercially available phosphite products against foliar infections of *Phytophthora nicotianae* on *Rhododendron* spp. The products were labeled as fertilizers or fungicides and formulated as soluble concentrates, granules, or slow-release tablets. In 2 separate trials, preventive applications were made to the root zone of containerized and field grown *Rhododendron* spp. Induced resistance was assayed by measuring lesion size following inoculation of detached leaves over time. Results: In the containerized greenhouse study, all phosphite products suppressed lesion development starting as early as 1 week post-treatment and suppression was sustained for 8 to 12 weeks, resulting in significantly reduced lesion area compared to inoculated, non-treated controls. In the field trial, Reliant L (fungicide) and Reliant Dry Phite 28G (fertilizer) suppressed cumulative lesion area 3 weeks post-treatment with effects persisting 6 and 8 weeks, respectively. All products suppressed cumulative lesion area at 4 and 6 weeks post-treatment except the phosphite tablet (fertilizer). Conclusions: Whether labeled as a fertilizer or fungicide or formulated as a liquid or granule, soil applications of phosphite products provided prolonged, systemic protection against foliar *Phytophthora* spp. infections in *Rhododendron* spp. to varying degrees.

**Keywords.** Induced Systemic Resistance; Integrated Pest Management; Polyphosphite.

Myles Ritchie and Andrew Kaufman  
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**Abstract.** Background: Hawai'i's exceptional trees are currently identified based on 7 selection criteria established in 1975. These criteria and their corresponding program components have remained stagnant with minimal improvements since the program's inception. This study builds upon previous exceptional (aka "heritage," "significant," "champion," "monumental," "notable," etc.) tree research conducted in other geographic locations in an attempt to discover if consensus exists regarding how these trees of importance should be identified, managed, and protected. Methods: A panel of 13 experts from around the state were presented 45 exceptional tree selection criteria and several program components using a 3-iteration Delphi method to determine if consensus exists on which selection criteria and program components should be used by Hawai'i's Exceptional Tree Program. Results: The results identified 33 exceptional tree selection criteria and 5 program components (i.e., protection mechanisms, private property exceptional tree maintenance costs, funding, public education and outreach, and program management best practices) recommended by the expert panel, as well as examples of how each should be implemented to improve the efficacy of this conservation program. Conclusions: These findings add to a growing body of exceptional tree research designed to identify, recognize, and protect a region's most valued trees, while also having applicability to urban forestry programs more broadly.

**Keywords.** Delphi Method; Exceptional Trees; Heritage Trees; Tree Protection; Urban Forest Policy; Urban Forest Governance; Urban Forestry Conservation.

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**Thiabendazole as a Therapeutic Root Flare Injection for Beech Leaf Disease Management ..... 215**



**Abstract.** Background: Thiabendazole (TBZ) has long been used in the arboricultural industry for tree injections as a key management tool of Dutch elm disease and sycamore anthracnose. This active ingredient is systemically distributed throughout the canopy and can offer multiple seasons of protection from these diseases. Well-studied in anthelmintic medicine, TBZ and other benzimidazole chemistries can be potent nematocides beyond their fungicidal use, disrupting microtubule assembly during mitosis with site-specific binding in some parasites. These nematocidal properties of TBZ allude to its potential in the management of beech leaf disease (BLD), caused by the foliar nematode *Litylenchus*

*crenatae mccannii* (Lcm). Methods: To test TBZ for BLD management, symptomatic beeches were injected in Aurora and Chardon, OH, and Hillsborough, NJ. Treatments were evaluated using a combination of late-season dormant bud nematode counts and year-over-year change in canopy density and BLD symptom expression. Results: After 11- and 22-months post-treatment, trees significantly improved based on visual ratings, and Lcm was reduced in dormant buds of TBZ injected trees, while nontreated controls continued to have high disease severity and large numbers of Lcm in dormant buds. An injectable TBZ treatment for beech trees offers a new mode of action and application method against Lcm and a more appropriate tool where foliar applications are impractical or where environmental exposure is of concern. Conclusions: This study introduces a novel and effective tool that can be utilized in an integrated pest management program for BLD.

**Keywords.** *Fagus*; Integrated Pest Management; Invasive Species; Nematicide.

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**Abstract.** Background: Large urban centers, such as São Paulo, have green areas interspersed with asphalt and buildings, requiring periodic maintenance to avoid issues with electrical networks. Urban tree management generates tons of pruning waste that is often deposited in landfills. Therefore, it is essential to discard these residues sustainably by composting and reusing the material to generate bioenergy and value-added products that support a circular economy. Methods: This study aimed to evaluate the biomass potential of pruning tree waste through a composting system by characterizing the cell wall composition, starch, lignin, and saccharification capacity. Results: The fermentable sugars in pruning tree waste are degraded during the composting process; however, the levels of starch, galactose, xylose, and arabinose are maintained during the first weeks of composting. Conclusions: These sugars can be utilized for energy production and contribute to the saccharification capacity. Throughout the 32-week composting process, lignin is not degraded; however, the decrease in other sugars in the biomass increases the proportion of lignin, suggesting opportunities for the use of thermal energy and green chemistry.

**Keywords.** Bioenergy; Biomass; Carbohydrates; Composting; Fermentable Sugars.

Jeffrey Facto

### **Perspectives on Private Property Urban Forest Dynamics Among Arborists in Sweden .... 237**

**Abstract.** Arborists have been described as the frontline workers in the urban forest. They apply their craft at the intersection of workplace culture, regulatory frameworks, and social-cultural perceptions of the ecosystem benefits of trees. How this impacts the provision and distribution of social and ecosystem benefits is poorly understood. With specific focus on how these workers shape urban forest management on private property in Sweden, we attempted to bring these perspectives into focus through dialogue. This study method included both a questionnaire and long form interviews to probe 3 primary questions: (1) *What are the drivers of tree removal on private land from the arborist's perspective?* (2) *How do arborists perceive their role and responsibilities towards private trees?* (3) *How do regulatory frameworks impact arborists' work, and what are arborists' opinions on these regulations?* In total we received 88 responses to the questionnaire, from which 5 participants were selected for a follow-up interview. Significantly, we found consensus among respondents that arborists in Sweden consider it their role to educate clients on the value of trees and that private trees are under-protected, and yet, nearly half of the respondents were unsure if their working area had tree by-laws at all. This highlights a need for greater dialogue between the arborist community and policy makers in Sweden to align efforts in maintaining a healthy urban forest.

**Keywords.** Arborist Perspectives; Political Ecology; Tree Workers; Urban Forestry.

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**Abstract.** Background: A tree is supposed to be an ecosystem in itself by storing and supporting a large number of organisms who live, feed, nest, take shelter, or interact with it. However, there are no full diversity studies within a single tree. Monumental trees are suitable field-based laboratories to explore niche biodiversity richness as a holobiont. Methods: Four ancient trees from different genera (*Populus*, *Pinus*, *Quercus*, and *Platanus*) were selected in the Madrid region (Spain) to analyze their species richness. We used field and molecular techniques during a single year (April to November). Results: About 300 taxa were found in each tree, including vertebrates, invertebrates, plants, fungi, bryophytes, lichens, bacteria, and myxomycetes with some chorological novelties. The ecological roles of the organisms found were explored. Conclusions: The high biodiversity found in these 4 trees is a compelling argument to consider old trees as a supporting ecosystem. Pruning and access to trees should be carefully considered to preserve ecological niches and therefore associated biodiversity.

**Keywords.** Ecological Niche; Inventory; *Pinus pinea*; *Platanus × hispanica*; *Populus × canadensis*; *Quercus ilex*; Species Richness; Veteran Trees.