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CONTENTS

Abstract. The erythrina gall wasp (EGW), believed native to Africa, is a recently described species and now serious invasive pest of *Erythrina* (coral trees) in tropical and subtropical locales. *Erythrina* are favored ornamental and landscape trees, as well as native members of threatened ecosystems. The EGW is a tiny, highly mobile, highly invasive wasp that deforms (galls) host trees causing severe defoliation and tree death. The first detection of EGW in the United States was in O´ahu, Hawai´i in April 2005. It quickly spread through the Hawai`ian island chain (U.S.) killing ornamental and native *Erythrina* in as little as two years. At risk are endemic populations of *Erythrina* as well as ornamental landscape species in the same genus, the latter of which have already been killed and removed from O´ahu at a cost of more than USD $1 million. Because EGW are so small and spread so quickly, host injury is usually detected before adult wasps are observed, making prophylactic treatments less likely than therapeutic ones. This study evaluates two stem-injected insecticides, imidacloprid (IMA-jet®) and emamectin benzoate, delivered through Arborjet Tree I.V.® equipment, for their ability to affect *E. sandwicensis* (*wiliwili*) canopy demise under severe EGW exposure. IMA-jet, applied at a rate of 0.16 g AI/cm basal diameter (0.4 g AI/in. dia.), was the only effective treatment for maintaining canopy condition of *wiliwili* trees. Emamectin benzoate, applied at a rate of ~0.1 g AI/cm basal diameter (~0.25 g AI/in. dia.), was not effective in this application, although it was intermediate in effect between IMA-jet and untreated trees. The relatively high concentrations of imidacloprid in leaves, and its durability for at least 13 months in native *wiliwili* growing on a natural, dryland site, suggest that treatment applications against EGW can impact canopy recovery even under suboptimal site and tree conditions.
Key Words: Coral Trees; Emamectin Benzoate; *Erythrina sandwicensis*; Imidacloprid; Tree Injection; *Wiliwili*.

Abstract. Recent research has improved our understanding of how structural roots of landscape trees respond to being located abnormally deep in the soil profile. This condition is widespread among landscape trees and may originate during nursery production, at transplanting into the landscape, or when construction fill or sediment deposits bury root systems of established trees. Deep structural roots sometimes hinder successful establishment of trees, occasionally enhance establishment, and often have little or no effect on growth or survival. When trees respond to deep structural roots, effects are sometimes observed when root collars are as little as 7.5 cm (3 in) deep. In some cases, deep structural roots are implicated in girdling root formation, but research in this area is quite limited. This review describes scientific progress in our understanding of deep structural roots and encompasses their history, causes, and significance, as well as interdisciplinary efforts to address deep planting and tree response during establishment to deep structural roots. A theoretical model of short-term tree response to deep structural roots is presented that helps explain these conflicting outcomes and provides a decision framework for practitioners evaluating trees with deep structural roots.
Key Words. Buried Roots; Deep Planting; Girdling Roots; Propagation; Root Architecture; Root Morphology; Urban Forestry.

Abstract. *Thaumastocoris peregrinus*, an Australian native, is a new and serious pest of urban eucalypts planted in Sydney and commercial centers of Australia. In recent years, it has spread to and attained pest status in South African *Eucalyptus* plantations and, more recently, has been discovered in Argentina and Uruguay. Mature *Eucalyptus scoparia* street trees, growing in a southern Sydney suburb, were microinjected with imidacloprid at three concentrations and monitored for three years. The abundance of *T. peregrinus* on treated eucalypts declined significantly compared to untreated trees over this time. Further, at the lowest concentration of chemical this insect was effectively controlled for two years. Imidacloprid (SilvaShield®; Bayer Environmental Science) has been registered in Australia for the control of *T. peregrinus*.
Key Words. Eucalypt Pest; Imidacloprid; Systemic Insecticide; *Thaumastocoris peregrinus*; Thaumastocoridae.

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Abstract. Trees cast shade on homes and buildings, lowering the inside temperatures and thus reducing the demand for power to cool these buildings during hot times of the year. The potential monetary savings may be sizable, especially for those who live in hot climates, because electricity usage for cooling residential and commercial structures in summer months is costly. A controlled experiment was conducted to quantify the impact of tree shade on electricity consumption devoted exclusively to cooling a structure. We examine electricity consumption used to run air conditioning units set at identical temperatures in two otherwise identical buildings, one set in full sun, the other in full shade during the summer months of 2008 in Beauregard, Alabama. The building in full sun required 2.6 times more electricity for cooling than the building in full shade. Our findings contribute to a growing body of research which demonstrates that owners of residential and commercial properties located in hot regions can reap sizable monetary savings from shade trees that serve as natural complements to their artificial air-conditioning.
Key Words. Energy Savings; Natural Cooling; Tree Shade.

Abstract. Conflict between city trees and infrastructure remains a problem in urban forestry. Municipal Wi-Fi, a citywide wireless computer network, may become a part of urban infrastructure, and because trees can diminish Wi-Fi signals, potential exists for conflict between urban trees and municipal Wi-Fi. This study examines attenuation of Wi-Fi signals in the City of Mountain View, California, U.S. by positioning a wireless-equipped computer so that trees obstructed the line-of-sight (LOS) between the computer and a Wi-Fi access point. Signal attenuation ranged from < 2 dB to 19 dB (mean: 5.6 dB), depending on the number and types of trees present. Although trees significantly attenuated signals, they did not diminish the average signal strength below -75 dBm (the minimum for a Wi-Fi connection) in any of the tests. A general linear model (r^2 = 0.55) indicated that some tree characteristics (tree size, canopy depth, leaf type), but not others (number of trees in LOS, presence of leaves, leaf size, and shape) helped explain variation in signal attenuation. As long as the effect of urban trees is taken into account during planning of Wi-Fi networks, trees should not interfere with municipal Wi-Fi operation.
Key Words: Interference; Urban Infrastructure; Wireless Network; Wi-Fi.

Abstract. In addition to the aesthetic and practical benefits of mulching, studies have shown indirect benefits of organic mulches to tree establishment and growth. These indirect benefits are associated with direct improvements on soil water and nutrient availability by mulches. The generalization of the organic mulches benefit to soil and trees has been questioned by several studies showing contradictory results under different experimental conditions and mulching materials. In addition, overall benefits for trees may be overlooked by focusing studies on some aspects of plant performance (e.g., plant growing rate) while ignoring others (e.g., plant chemical defense). This paper reviews studies showing how organic mulches can directly affect plant resource availability in the soil, presenting evidence from the literature that illustrates the influence of organic mulches on plant resource availability can also affect tree photosynthate allocation dynamics with direct consequences on plant chemical defenses. Based on the reviewed literature, presented here is a mechanistic pathway to illustrate how organic mulches can influence plant resources in the soil, and in turn how that can affect tree physiology and tree-insect interactions in urban areas.
Key Words. Growth-Differentiation Balance; Nitrogen Availability; Photosynthate Allocation; Water Availability.