

## ARBORICULTURAL ABSTRACTS

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### DENSITY-DEPENDENT PARASITISM OF THE HACKBERRY NIPPLEGALL MAKER (HOMOPTERA: PSYLLIDAE): A MULTI-SCALE ANALYSIS

J.T. Lill

The spatial scale employed in field studies investigating density-dependent parasitism of insect hosts may influence the results of such investigations. As an empirical test of this observation, the relationship between the density of hackberry nipplegall makers, *Pachypsylla celtidismamma* (Fletcher), on hackberry, *Celtis occidentalis* L., and parasitism by the specialist parasitoid *Psyllaephagus pachypsyllae* Howard was examined at 3 spatially nested scales: leaves, branches, and trees. The distribution of galls among leaves on trees was highly clumped, and gall density varied considerably among leaves, branches, and trees, regardless of how it was measured (absolute number of galls, galls per leaf, or proportion of galled leaves). At the individual leaf level, parasitism was higher for galls on leaves with multiple galls than for single galls. However, the incidence of parasitism did not increase with increasing gall densities on the multiply galled leaves, indicating that parasitoids, although attracted to high-density patches, do not appear to remain in these patches. Parasitism was found to be density independent at the branch level, regardless of how density was measured, indicating that parasitoids do not respond to host density at this spatial scale. However, at the whole-tree level there was a significant positive relationship between density and parasitism for 2 measures of gall density: absolute gall number and galls per leaf. This pattern may result from the establishment of highly localized populations of parasitoids around trees with consistently high galling levels. Overall, the relationship between gall density and parasitism was found to be complex and scale dependent. (*Environ. Entomol.* 1998. 27(3):657–661)

### PHOTOSYNTHETIC RESPONSES OF EUCALYPTUS NITENS (DEANE AND MAIDEN) MAIDENTREES TO GREEN PRUNING

E.A. Pinkard, C.L. Beadle, N.J. Davidson, and M. Battaglia

Three-year-old *Eucalyptus nitens* (Deane and Maiden) Maidentrees and 1-year-old ramets of a single clone of *E. nitens* were pruned to remove 0, 50%, or 70% of the green crown length. This was equivalent to removal of 0, 55%, or 88% of foliage area of trees, and 0, 77%, or 94% of foliage area of ramets.  $\text{CO}_2$  assimilation ( $A$ ) and stomatal conductance ( $g_s$ ) were measured at constant illumination in 5 height zones and 3 foliage-age classes of trees over a 16-month period following pruning. Foliar nitrogen (N) and phosphorous (P) concentrations were determined for each measurement time during the first 12 months of the experiment. In ramets  $A$  and  $g_s$  were measured in 4 height zones and 2 foliage-age classes over a 6-week period, and N and P concentrations were measured only once, at the end of the experiment. Rates of  $A$  increased by up to 175% following pruning. This response occurred throughout the canopy irrespective of position in the crown or foliage age. The magnitude of the response was generally greater in ramets than in trees, and increased with increasing severity of pruning. The initiation of the response was later, and the duration of the response was longer, in trees than ramets. In the lower crown of trees there was evidence of delayed senescence following pruning. Photosynthetic enhancement was not related to changes in foliar N concentrations. The ratio of  $A$  to N increased in many zones following pruning, especially after more severe defoliation. There was no evidence that changes in P concentrations were responsible for the result. The increases in  $A$  have been related to changes in  $g_s$ , as maximum values of  $g_s$  were greater, and the ratio of  $A/g_s$  was generally lower, in pruned than unpruned plants. (*Trees.* 1998 12:119–129)

### HOW TO READ THE RESULTS OF RESISTOGRAPH

M.C. Mattheck, K. Bethge, and W. Albrecht

Two impact devices for the detection of the internal decay of trees—the Resistograph M300 and the Resistograph M500—which provide a drilling profile print-out for use in trees and construction timber to a maximum depth of 500 mm, are described. Twenty figures demonstrate the results provided by the Resistograph in the detection of decay, wet wood cracks, and tension wood. (*Arboric. J.* 1997. 21:331–346)

### ROOT PRUNING RED MAPLE AND WASHINGTON HAWTHORN LINERS DOES NOT AFFECT HARVESTED ROOT LENGTH AFTER TWO YEARS OF FIELD PRODUCTION

J. Roher Harris and Jody Fanelli

Root pruning field-grown trees during production can increase harvested root length, but it is a time consuming and expensive practice. Root pruning before lining out instead of during production is much faster and cheaper. This study tested the effect of root pruning red maple (*Acer rubrum* L.) and Washington hawthorn (*Crataegus phaenopyrum* (L.f.) Medic.) trees. Bare-root liners were root pruned before planting in nursery rows, and top growth, shoot:root ratios, and harvested root length within rootballs were measured after 2 years of field growth. Pruning root systems back 25%, 50%, or 75% had little effect on top growth or shoot:root ratios for either species. (*J. Environ. Hortic.* 1998. 16(3):127–129)

### DIFFERENCES IN GROWTH OF CONTAINER-GROWN RED MAPLE CULTIVARS IN DIFFERENT HARDINESS ZONES

Jeff L. Sibley, John M. Ruter, and D. Joseph Eakes

Growth of eight container-grown red maple cultivars was evaluated at 4 locations under dissimilar environmental conditions/hardiness zones in Georgia and Alabama for 2 years. Rooted cuttings and tissue cultured plantlets were planted in #3 (9.1-L) containers in 1 location in the same substrate in April 1995. Trees were transported the second week of June to Blairsville, GA; Muscle Shoals, AL; Auburn, AL; and Tifton, GA in USDA hardiness zones 6b, 7a, 8a, and 8b, respectively. Dormant trees were transplanted to #10 (38-L) containers the second week of December 1995. At the conclusion of the study, December 1996, growth differed by location and cultivar. Height and stem diameter increase, and root and stem dry weights were greatest at the 2 Alabama locations for most cultivars and were least at the 2 Georgia locations. Root:shoot ratios were greatest at the 2 Georgia locations, an indication of increased carbon partitioning of photoassimilates to roots over stems under dryer growing conditions. Irrigation rates and different environmental conditions among locations have a significant impact on growth response of container-grown red maple cultivars. (*J. Environ. Hortic.* 1998. 16(3):130–134)