ARBORICULTURAL ABSTRACTS

IMPACT OF *BACILLUS THURINGIENSIS* APPLICATION ON *ENTOMOPHAGA MAIMAIGA* (ENTOMOPHTHORALES: ENTOMOPHTHORACEAE) AND *LD*NPV-INDUCED MORTALITY OF GYPSY MOTH (LEPIDOPTERA: LYMANTRIIDAE)

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The effect of aerial application of *Bacillus thuringiensis* variety *kurstaki* Berliner (*Btk*) on mortality of gypsy moth larvae caused by the entomopathogens *Entomophaga maimaiga* Humber, Shimazu, and Soper, and the gypsy moth nucleopolyhedrosis virus (*Ld*NPV) was evaluated. Three sites in 1997 and four sites in 1998 were established in a randomized complete block design. Larvae were collected weekly to determine the proportion infected with *E. maimaiga* and *Ld*NPV. In 1997, epizootics of *E. maimaiga* in control plots boosted infection rates (61%) to levels twice that in *Btk*-treated plots (33%). Postseason egg mass density and defoliation did not differ between treatments, indicating population reduction early in the season by *Btk* or late in the season by *E. maimaiga* was equivalent. Few larvae became infected with *Ld*NPV in 1997, probably because of the relatively low densities of gypsy moth larvae. In 1998, *E. maimaiga* was again more active in control plots than compared with 1997. *Ld*NPV was also more active in control plots than in *Btk*-treated plots. On the peak infection date, infection levels in control plots (26%) were sixfold higher than in *Btk*-treated plots (4%). Despite greater *Ld*NPV activity in control plots in 1998, aerial application of *Btk* was much more effective than natural *Ld*NPV in suppressing gypsy moth populations. Final egg mass counts were 89% lower in *Btk*-treated plots compared with control plots. *E. maimaiga* and *Ld*NPV disease prevalence increased with increases in larval density. Early spring inoculum levels and weather conditions were similar for all plots. Therefore, reduced infection levels in *Btk*-treated plots were most likely the result of a slower rate of spread of *E. maimaiga* and *Ld*NPV among larvae in these plots where the larval density was reduced 5- to 10-fold from *Btk*. When *E. maimaiga* is active, as observed in 1997, low-density populations of gypsy moth may be held in check by *E. maimaiga* as well as by *Btk* applications. However, unusually dry conditions, like we observed in 1998, may suppress *E. maimaiga* activity and allow gypsy moth populations to build. (Environ. Entomol. 2000. 29(6):1312–1322)

POTENTIAL EFFECT OF *ANOPLOPHORA GLABRIPENNIS* (COLEOPTERA: CERAMBYCIDAE) ON URBAN TREES IN THE UNITED STATES

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Anoplophora glabripennis Motschulsky, a wood borer native to Asia, was recently found in New York City and Chicago. In an attempt to eradicate these beetle populations, thousands of infested city trees have been removed. Field data from nine U.S. cities and national tree cover data were used to estimate the potential effects of *A. glabripennis* on urban resources through time. For the cities analyzed, the potential tree resources at risk to *A. glabripennis* attack, based on host preferences, ranges from 12% to 61% of the city tree population, with an estimated value of $72 million to $2.3 billion per city. The corresponding canopy cover loss that would occur if all preferred host trees were killed ranges from 13% to 68%. The estimated maximum potential national urban impact of *A. glabripennis* is a loss of 34.9% of total canopy cover, 30.3% tree mortality (1.2 billion trees), and value loss of $669 billion. (J. Econ. Entomol. 2001. 94(1):116122)

RESPONSE OF FIVE WOODY LANDSCAPE PLANTS TO PRIMO AND PRUNING

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The use of Primo (trinexapac-ethyl) was investigated as an alternative to pruning of container-grown woody ornamental species. A foliar spray of 469, 938, or 1407 ppm (0.5, 1.0, or 1.5 oz/gal) was applied to pruned plants. A nontreated control (water) and an industry control [Atrimmec (dikegulac-sodium)] were also included for comparison. Monthly mechanical pruning or no pruning treatments were imposed during the production period. Monthly pruning alone reduced the height of euonymus, forsythia, Chinese privet, waxleaf privet, and azalea. Efficacy of plant growth regulator treatments differed among the five species. Primo was not effective in suppressing the height or trimming dry weight of forsythia, Chinese privet, or waxleaf privet and provided only a transient suppression of euonymus and azalea. (J. Environ. Hortic. 2000. 18(3):132–136)

OVERLAYING COMPACTED OR UNCOMPACTED CONSTRUCTION FILL HAS NO NEGATIVE IMPACT ON WHITE OAK AND SWEETGUM GROWTH AND PHYSIOLOGY

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Raising the soil grade, frequently required during building construction, is thought to damage trees and is of concern to foresters responsible for tree protection on such sites. We investigated the effects of applying fill over the roots of 22-year-old white oaks (*Quercus alba* L.) and 13-year-old sweetgums (*Liquidambar styraciflua* L.). Treatments included a control (no fill), fill (sandy loam C horizon soil spread 20 cm deep), and compacted fill (same as full but compacted). Trees with fill had soil held away from trunks or not. After 3 years, there was no consistent treatment effect on growth, chlorophyll fluorescence, or soil respiration in either species. Fill disrupted normal soil moisture patterns. White oak plots with fills had lower soil water contents than controls. In sweetgum plots, soil underlying fill was typically drier than fill layers, whereas control plot soil moisture tended to increase with depth. Fills did not affect overall root density for either species. White oak grew roots well into fill soils, but sweetgum did not, although sweetgum root distribution shifted upwards under fills. Other factors associated with raising the grade, such as soil trafficking and root severance, may be responsible for much of the tree decline attributed to fill. (Can. J. For. Res. 2001:31:100–109)

REINVIGORATION OF MATURE CHESTNUT (*CASTANEA SATIVA*) BY REPEATED GRAFTINGS AND MICROPROPAGATION

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Gradual reinvigoration of adult chestnut (*Castanea sativa* M. cv. Montemarano) shoots was obtained by serial grafting onto juvenile rootstocks. The phenomenon was evaluated on the basis of percentage of primary nodes regenerating axillary shoots and length and number of shoots (>10 mm) per primary node. *In vitro* growth of explants from serially grafted shoots was significantly lower than that of explants from seedlings at the end of the establishment phase. Only microshoots from seedlings and plants that had been serially grafted four times could be subcultured on proliferation medium. Repeated subculture on medium containing a low cytokinin concentration induced progressive reinvigoration of microshoots derived from plants that had been serially grafted four times. The number of axillary shoots per explant increased significantly after six subcultures. After 12 subcultures, microshoots from serially grafted plants showed an increase in stem elongation, rooting and plantlet survival. After *in vitro* stabilization, there was no difference in *in vitro* performance between microshoots derived from seedlings and serially grafted plants. Microshoots multiplied from serially grafted plants displayed only a transitory appearance of juvenile traits. (Tree Physiol. 2000. 20:1243–1248)

COLONIZATION AND GROWTH EFFECTS OF THE MYCORRHIZAL FUNGUS *GLOMUS INTRARADICIES* IN A COMMERCIAL NURSERY CONTAINER PRODUCTION SYSTEM

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The objectives of this research were to demonstrate that mycorrhizae can survive in a commercial nursery container production system, and enhance plant productivity. Four species were used as host plants [*Nandina domestica* 'Moon Bay', *Loropetalum chinense* variety *rubrum* 'Hinepurpleleaf' Plumb delight®, *Salvia gregii*, and *Photinia fraseri*]. Plants were inoculated with arbuscular mycorrhizal fungi, *Glomus intraradices*, and grown in a commercial nursery in Texas. For the first 5.5 months, plants were grown in #1 cans containing either 3 kg/m^3 (5 lb/yd^3) or 4.2 kg/m^3 (7 lb/yd^3) 24N-4P_2O_5-8K_2O. For the final 6.5 months of the study, plants were in larger containers, all of which contained 4.2 kg/m^3 24N-4P_2O_5-8K_2O. The commercial inoculum of *Glomus intraradices* only enhanced growth of *N. domestica*. The shoot dry mass of mycorrhizal *N. domestica* plants at 3 kg/m^3 was the same as noncolonized plants at the higher fertility level of 4.2 kg/m^3. Intraradical hyphae development and colonization (total arbuscules, vesicles/endospores, hyphae) of *L. chinense*, *N. domestica*, and *S. gregii* increased at the higher fertility levels. *S. gregii* had the greatest mycorrhizal development and a 216% increase in hyphae development and colonization at the higher fertility level. (J. Environ. Hortic. 2000. 18(4):247–251)

BIOMECHANICAL STUDY ON THE INTERACTIONS OF ROOTS WITH GAS AND WATER PIPELINES FOR THE EVALUATION OF TREE SITES

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Root–pipeline interactions result from the biomechanical self-optimization of trees (i.e., cyclic fatigue failures) or from the hydrotropism of the tree roots (resulting in the blockage of pipelines). The latter may be problematic, but it hardly presents a threat to life. (Under certain circumstances though, it may occur at distances of up to 40 m from the tree). Fatigue failures, in particular of gas pipelines, constitute the real risk. Here, the pipeline becomes used by the tree for anchoring, and the growth of the anchoring root is promoted by the tree. The most dangerous forces are introduced by a root sling which is formed on the windward side of the tree, beneath a pipeline. Even wind loading characteristics which are classified as harmless, may result in pipeline breakage when their fatigue strength in the area of the load introduction in small. For example, this applies to areas such as imperfect welds or material defects in the pipeline. In addition to this fatigue load, a risk of wear results from stones being surrounded by the growing roots. A checklist within the paper allows the hazard potential of trees to be specified within the context of a simple load classification. However, the checklist is subject to some major caveats. Also, it is important to appreciate that no evaluation of a crucial factor, pipeline strength, can be given without a careful consideration of pipeline material and welding quality. (Arboric. J. 2000. 23:343–377)