ARBORICULTURAL ABSTRACTS

EFFECTS OF NURSERY CONTAINER TYPE ON ROOT GROWTH AND LANDSCAPE ESTABLISHMENT OF ACER RUBRUM L.

M.D. Marshall and E.F. Gilman

Trees of red maple (Acer rubrum L.) were planted into seven container types evaluated for their ability to reduce number of roots deflected by the container wall. Seedlings were grown 70 weeks (production phase) in seven container types to a mean trunk diameter of 3.9 cm (1.5 in.) and were transplanted into a sandy soil and grown with frequent or periodic irrigation for 24 weeks (landscape phase). There was no effect of container type on total root mass, trunk diameter or height during the production phase. Total deflected root length was less in low-profile plastic containers, chemical root pruning containers, air root pruning containers (ARPC), and wood boxes than in standard black plastic containers (SBPC). Trees produced in the SBPC had the most horizontally-oriented deflected root length while the ARPC and SBPC had the most vertically-oriented deflected root length. Trees grown in the ARPC had less roots on the inside of the root ball than all other container types. Container type did not influence root and shoot growth, but impacted stem water potential in the first five months after transplanting to the landscape. Trees frequently irrigated during the landscape phase had greater trunk diameter, height, and generated more new root mass than those which were frequently irrigated. (Journal of Environmental Horticulture. March 1998. 16(1):55–59)

SURVIVAL OF HEMLOCK WOLLY ADELGID (HOMOPTERA: ADELGIDAE) AT LOW TEMPERATURES.

B.L. Parker, M. Skinner, S. Gouli, T. Ashikaga, and H.B. Teillon

The hemlock wooly adelgid (Adelgies tsugae Annand [Homoptera: Adelgidae]) (HWA), a nonnative insect, is a major threat to New England forest and suburban environments, where one of its hosts, eastern hemlock, Tsuga canadensis (L.) Carriere, is a dominant native tree species. To determine the potential spread of HWA into northern New England, we studied the winter coldhardiness of a northerly population. Sistens were collected at three times during the winter and subjected to temperatures typical of those during winter in the next coldest USDA plant coldhardiness zone. Samples collected in January and February 1996 were subjected to –20, –25, and –30½C; those collected in March to –15, –20, and –25½; all date-temperature treatments were tested at exposure times of 1, 2, 4, 8, and 24 hr. When all exposure times were combined, the percentage of live adelgids after subzero treatment (adjusted for control mortality at 0½C) declined significantly as temperature decreased. In most cases, fewer HWA were alive after treatment as exposure time increased. Significantly more HWA collected in January were alive after treatment than those collected in February and March. This suggests that HWA coldhardiness declines over this time period. When comparing the percentage of live HWA from February and March for –20 and –25½C, a noticeable decline occurred between the February and March sample dates. Although mortality was as high as 95% in one of the most severe treatments (February collection exposed to –30½C for 24 hr), the fact that complete mortality did not occur suggests that HWA may be able to continue to expand its range into areas with colder winters. (Forest Science. 1998. 44(3):414–420)

AN ASSESSMENT OF THE USE OF CROWN STRUCTURE FOR THE DETERMINATION OF THE HEALTH OF BEECH (FAGUS SYLVATICA)

J.L. Innes

Considerable difficulties exist with the standardization and interpretation of assessments of crown defoliation, the most commonly used index of tree health in Europe. A variety of other measures of crown condition exist and one that has received considerable attention, particularly for beech (Fagus sylvatica L.), is crown architecture. Four stages of crown development are generally recognized, termed the exploration, degeneration, stagnation and resignation phases. An analysis of the available literature suggests that there are a number of problems surrounding the use of these classes to describe trees. Although the classes probably reflect the progressive deterioration of the crown of a tree, there are many factors that affect the assessment and interpretation of the scores, as is the case for defoliation estimates. Measurements of shoot elongation in the upper crown provide a more useful measure, but involve destructive sampling and are very time-consuming. Consequently, while crown architectural assessments should only be incorporated into large-scale inventories of forest health with great care, they may be useful for case studies involving the detailed examination of a small number of sites. (Forestry. 1998. 71(2))

EFFECT OF ROOT SEVERANCE ON GROWTH OF FIELD-GROWN SUGAR MAPLE

J.R. Harris, P. Knight, and J. Fanelli

This study addresses the growth limits imposed on large landscape trees by root severance at harvest and tests the effect of rootball size on stress following root severance. Two rootball sizes and a nontreated control treatment were randomly assigned to Acer saccharum Marsh. (sugar maple) trees in four adjacent nursery rows at Waynesboro Nurseries, near Waynesboro, VA. One rootball size (75 cm in diameter) corresponded to the American Association of Nurserymen standards, and the other was 90 cm in diameter. Trees were dug with intact rootballs before bud swell. Height growth of root-severed trees was 19%, trunk diameter increase 10%, and twig extension 18% of control trees 2 years after root severance. Total stem nonstructural carbohydrate content was greater for root-severed trees, presumably due to lack of a dilution effect. Although growth was severely curtailed by root severance, no effect on growth or measured plant stress indicators resulted from the use of a 90-cm vs. a 75-cm-diameter rootball. (HortScience. 1998. 33(1):21–23.)

RELATIONSHIP BETWEEN CROWN ARCHITECTURE AND BRANCH ORIENTATION IN RAIN FOREST TREES

D.A. King

Measurements of the dimensions and angles of branches on saplings of 58 species in rain forests of NE Australia and Central America showed that architectural groups defined in terms of developmental rules differ in branch shape and angle. Species were classified into four groups based on visual assessments of leaf arrangement and trunk form. The three plagiotropic groups (with planar leaf arrangements) had more nearly horizontal branches than the orthotropic group (with more three dimensional leaf arrangements). The plagiotropic groups each had a significantly lower ratio of branch depth to width than the orthotropic group, with branch width defined as the horizontal breadth of the branch foliage and depth defined as the thickness of the foliage perpendicular to the branch axis and the width measurement. The three plagiotropic groups differed in the angle of the branch tip relative to the overall branch. However, individual saplings of the different groups showed some overlap in branch characteristics. Branch angle and depth to width ratio were correlated and were related to light level, the latter assessed for three Tasmanian rain forest species. Both plagiotropic and orthotropic species had more erect three-dimensional branches in open environments than in shade. Thus, the architectural groups differ in branch geometry in common environments, but also exhibit plasticity in response to light. (Annals of Botany. 1998. 82:1–7)

ROADSIDE TREES IN URBAN HONG KONG: PART III, TREES SIZE AND GROWTH SPACE

C.Y. Jim

The dimensions of the entire population of 19,154 street trees in urban Hong Kong had been measured in the field in a recent census. The same study also collected detailed data on the dimensions of the roadside growth space of individual trees. The results yield useful information on tree-size distribution, and its relationship with species composition, changing species preference over the years, and projected long-term arboreal character of the city. The immediate roadside environment of the trees was analyzed in terms of dimensions and types of growth space to highlight their association with tree size. The interpretations provide hints for tree managers to modify species choice with reference to attainable size and in comparison with the ground truth in the planning and management of roadside trees in a cramped environment is emphasized. (Arboricultural Journal. 1997. 21:73–88)

BIOSTIMULANTS AND SOIL AMENDMENTS AFFECT TWO-YEAR POSTTRANSPLANT GROWTH OF RED MAPLE AND WASHINGTON HAWTHORN

M. Kelting, J.R. Harris, and J. Fanelli

Humate-based products have been aggressively marketed as biostimulants that increase plant growth. Little data are available on their affect on tree establishment or their interaction with fertilizer and irrigation regimes. This experiment tested several types of biostimulants on posttransplant growth of Acer rubrum L. (red maple) and Cratageus phaenopyrum (Blume) Hara (Washington hawthorn) trees, both with and without irrigation and fertilization. Soil treatments were applied at planting as: 1) control (native backfill only); 2) compost (native backfill + yard-waste compost); 3) peat (native backfill + Canadian sphagnum peat); 4) granular humate, 100g/tree; 5) granular humate, 200g/tree; and 6) liquid humate +, a proprietary liquid mixture of humate, kelp extract, thiamine, and intermediate “metabolites.” Irrigation regime x soil treatment interaction was significant for red maple, but soil treatments did not increase height, stem diameter, top dry mass, or root length. For Washington hawthorn, soil treatments did not increase height, stem diameter, or root length, but top dry mass in all treatments as a group and in humate-treated trees in particular was greater than that of controls. Roots of peat-treated trees of both species were longer than those in other treatments. Granular humate applied at 200g/tree increased total root length more than did 100g/tree in Washington hawthorn but not in red maple. Fertilizing at planting with N at 14.5 $g \cdot m^{-2}$ had no effect on any parameter measured for either species. (HortScience. August 1998. 33(5))