ARBORICULTURAL ABSTRACTS

URBAN WOODLANDS: THEIR ROLE IN REDUCING THE EFFECTS OF PARTICULATE POLLUTION

K.P. Beckett, P.H. Freer-Smith, and G. Taylor

In recent years, a substantial research effort has focused on 3 links between particulate air pollution and poor health. As a result, the PM_{10} value has been set as a measure of such pollutants that can directly cause illness. Due to their large leaf area relative to the ground on which they stand and the physical properties of their surfaces, trees can act as biological filters, removing large numbers of airborne particles and hence improving the quality of air in polluted environments. The role of vegetation and urban woodlands in reducing the effects of particulate pollution is reviewed here. The improvement of urban air quality achieved by establishing more trees in towns and cities is also illustrated. (Environ. Pollut. 1998. 99:347–360)

CONDITION OF GREEN ASH, INCIDENCE OF ASH YELLOWS PHYTOPLASMAS, AND THEIR ASSOCIATION IN THE GREAT PLAINS AND ROCKY MOUNTAIN REGIONS OF NORTH AMERICA

J.A. Walla, W.R. Jacobi, N.A. Tisserat, M.O. Harrell, J.J. Ball, G.B. Neill, D.A. Reynard, Y. Guo, and L. Spiegel

About 50% of 1,057 green ash (Fraxinus pennsylvanica) systematically sampled in the Great Plains and Rocky Mountain regions had substantial dieback (>10% of crown branches with dieback), and the average growth ring width during the last 20 years was 2.9 mm. The overall condition of the population was rated fair. Ash yellows phytoplasmas were identified at 102 of 106 sites throughout 6 U.S. states (North Dakota, South Dakota, Wyoming, Nebraska, Colorado, Kansas) and 3 Canadian provinces (Alberta, Saskatchewan, Manitoba). These phytoplasmas had not previously been known in Alberta, Saskatchewan, Manitoba, Wyoming, Colorado, or Kansas. Incidence of phytoplasmal detection ranged from 16% in Wyoming to 71% in South Dakota. Incidence varied in the range 41% to 67% across site types and crown dieback classes. Incidence was highest in rural plantings, in trees with the most crown dieback, and in larger diameter trees. No significant relationships were detected between presence of ash yellows phytoplasmas and radial growth rates of trees. (Plant Dis. 2000. 84:3)

ETIOLOGY OF OAK DECLINE IN SPAIN

F.J. Gallego, A0.P. de Algaba, and R. Fernandez-Escobar

In different areas of Extremadura, Western Spain, soil samples were taken at the bottom of holm oak (Quercus ilex) trees that were showing decline symptoms. Half of each sample was sterilized, and acorns were sown in both sterilized and nonsterilized soil samples. The resulting seedlings were used as baits for the isolation of fungi. Seedlings growing on the natural, nonsterilized substrate were characterized by having a lower vegetative growth than the ones growing on the sterilized-soil samples, and most of them died. Phytopthora cinnamomi was consistentlv isolated from their roots. Fusarium oxysporum was also isolated as well as different species of Pythium, although to a lesser extent. Pathogenicity tests were performed on holm oak seedlings with five different isolates with F. oxysporum, Pythium, and with a mixture of the three fungi. All the inoculated seedlings with P. cinnamomi developed root rot and grew slowly, and 35.7% of them died up to the end of the experiments. P. cinnamomi was consistentlv isolated from their roots, indicating that this fungus is the casual agent of holm oak decline. However, F. oxysporum caused similar symptoms on oak seedlings as P. cinnamomi, and was isolated also from the roots, although its frequency was lower than that of P. cinnamomi. (Eur. J. For. Path. 1999.29:17–27)

ROOT AND SHOOT GROWTH PERIODICITY OF POT-IN-POT RED AND SUGAR MAPLE

J.R. Harris and J.K. Fanelli

Red maple (Acer rubrum L. 'Franksred') and sugar maple (A. saccharum Marsh. 'Green Mountain') trees were grown in a 56-L (15 gal) pot-in-pot system for two years. During the second year of production, root growth was observed through observation plates fitted into the container sidewalls, and shoot extension was periodically measured. Root growth began in early March, approximately one month before budbreak for both species. Root growth dramatically slowed down at the onset of budbreak, but quickly resumed and was concurrent with shoot elongation. Root growth slowed dramatically in the fall when substrate temperatures dropped to 5°C to 7°C (40°F to 45°F). Root growth stopped during the winter for red maple, but some nominal root growth continued throughout the winter for sugar maple. Red maples had over 5 times more total root length against observation plates at the end of the experiment than sugar maples. (J. Environ. Hortic. 1999. 17(2):80–83)

DEVELOPMENT OF STRUCTURAL ROOT ARCHITECTURE AND ALLOMETRY OF QUERCUS PETRAEA

M. Drexhage, M. Chauviére, F. Colin, and N.N. Nielsen

Root growth direction, radial distribution of roots, and biomass partitioning within the root system were examined on fifty-five 20- and 28-year-old sessile oak (*Quercus petraea* (Matt.) Liebl.) trees. The root systems were spatially divided into three concentric cylinders. Diameters and compass direction of roots were recorded at each point where they crossed one of the cylinders. Analysis of the distribution of root cross-sectional area (A_r) at 30 cm radius from the stem showed clustering in a preferred direction only for 10 small trees (diameter at breast height (dbh) <9cm). A classification of four incline growth types was used to describe differences in root architecture associated with the different age stands. Approximately 75% of all roots kept their orientation throughout the root-soil plate on both plots. Equations were developed to describe allometric relationships between basal area, dbh, sum of A_r, and root biomass. With increasing stem diameter, the root biomass was allocated predominantly to and evenly distributed within the surface root system, effectively increasing tree stability. Results from this study support the idea that root system architecture is inherently determined and that dbh or proximal root diameter measurements are sufficient to predict root biomass of young sessile oak when soil properties are nonrestrictive. Can. J. For. Res. 1999. 29:600–608.)

PLANT MINERAL ACCUMULATION, USE AND TRANSPORT DURING THE LIFE CYCLE OF PLANTS: A REVIEW

A. Liptay and A.E. Arevalo

Minerals accumulated during each stage of plant development are important, especially for the initial portion of subsequent stages of growth. For example, minerals acquired during seed ontogeny are largely responsible for the earliest stage of seedling growth. Without these minerals, seedling development would be arrested or impossible. Thus, even though the amount of minerals may be relatively small in the seed, their presence is absolutely essential. Similarly, although the mineral nutrient content of a seedling used as a transplant in establishing a crop in the field may seem rather minuscule, the importance to the initiation of development of the successive stage of growth is critical. Moreover, seedling-mineral content, plant performance and seed production can be improved by the selection of optimal cultural practices. This review examines acquisition, content, and use of minerals in the various stages of plant development and growth as well as agricultural approaches to enhance mineral accumulation. (Can. J. Plant Sci. 2000. 80:29–38)