ARBORICULTURAL ABSTRACTS

THE MYCOBIOTA IN NONMYCORRHIZAL ROOTS OF HEALTHY AND DECLINING OAKS

Erhard Halmschlager and Tadeusz Kowalski

A detailed survey of the mycobiota in roots of declining and healthy-looking oak trees was conducted at two sites in eastern Austria that clearly differed in humus and soil type and pH. Overall colonization of living and dead oak roots was 97.7% and 98.5%, respectively. Colonization frequency of the cortex was nearly twice that of the central cylinder in living roots. The species assemblage comprised 126 fungal taxa. Species composition varied greatly between sites and less between living and dead roots from the same site. Fungal association on living roots at Niederweiden was dominated by *Cadophora fastigiata* Lagerb. & Melin, which occurred in 50% of roots, and *Cylindrocarpon destructans* (Zinssm.) Scholten. Together with *Cryptosporiopsis melanogena* Kowalski & Halmschlager and Basidio mycete R157, these two species were also the major components in dead roots. At Patzmannsdorf, the fungal community in living roots was dominated by *Cystodendron* sp. 1, *Cadophora*-like R018, and *Cryptosporiopsis radicicola* Kowalski & Bartnik, whereas in dead roots *Xylaria hypoxylon* (L. ex Hooker) Grev. was the dominant species. No substantial differences were found between the root mycobiota in healthy and declining trees. Apart from *Armillaria ostoyae* (Romagnesi Herink and *Cylindrocarpon destructans*, the majority of isolated species were considered endophytes or saprophytes that are most likely not involved in the dieback of oak roots. (Can. J. Bot. 2004. 82(10):1446–1458)

THE RE-EMERGENCE OF INDIGENOUS FOREST IN AN URBAN ENVIRONMENT, CHRISTCHURCH, NEW ZEALAND

Glenn H. Stewart, Maria E. Ignatieva, Colin D. Meurk, and Richard D. Earl

Christchurch, the second largest city in New Zealand, is a planned city on a coastal plain on the east coast of the South Island. The birth of the city and the subsequent century of development was characterized by colonial values and tree and garden planting with familiar European species along with those from Australia, North America, and eventually all other continents. The image of an "English garden city" with classical parks of oaks and willow-lined rivers became the accepted norm and the way in which the city has been promoted to potential tourists. Gardening is one of the top two recreational activities and exotic species greatly outnumber native species in the flora and in gardens. This has had serious consequences for the highly fragmented and degraded indigenous vegetation and its co-adapted wildlife. A few hardy indigenous species continued to regenerate through this period, but since the 1970s, there has been a progressive change of attitude and interest in reclaiming the natural heritage of the city, manifest in widespread private and public planting of indigenous species and active habitat restoration. In this article we examine the indigenous and exotic shrub and tree components of the Christchurch flora as planted street trees, in domestic gardens, and in parks. We also present data on shrub and tree regeneration in parks and domestic gardens in the city. Indications are that the more sensitive, less intrusive management of urban environments, combined with the greater density of indigenous seed sources, has allowed regeneration of a wide range of indigenous species across a broad spectrum of habitats—from neglected gardens to pavement cracks to exotic plantations. This is despite the competition from the prodigious seed banks and density of exotic trees, shrubs, and ground covers and albeit minimal impacts of introduced browsing and seed eating mammals. If the present trends continue through appropriate management and facilitation, these tentative signs of native forest regeneration should eventually proliferate into a sustainable mixed origin urban forest that resurrects and preserves the natural character of the region. (Urban For. Urban Green. 2004. 2:149–158)

APPLICATIONS OF TAGGING AND MAPPING INSECT RESISTANCE LOCI IN PLANTS

G.C. Yencho, M.B. Cohen, and P.F. Byrne

This review examines how molecular markers can be used to increase our understanding of the mechanisms of plant resistance to insects and develop insect resistant crops. We provide a brief description of the types of molecular markers currently being employed, and describe how they can be applied to identify and track genes of interest in a marker-assisted breeding program. A summary of the work reported in this field of study, with examples in which molecular markers have been applied to increase understanding of the mechanistic and biochemical bases of resistance in potato and maize plant/pest systems, is provided. We also describe how molecular markers can be applied to develop more durable insect-resistant crops. Finally, we identify key areas in molecular genetics that we believe will provide exciting and productive research opportunities for those working to develop insect resistant crops. (Annu. Rev. Entomol. 2000. 45:393–422)

CALIBRATING SOIL RESPIRATION MEASURES WITH A DYNAMIC FLUX APPARATUS USING ARTIFICIAL SOIL MEDIA OF VARYING POROSITY

J. R. Butnor and K. H. Johnsen

Measurement of soil respiration to quantify ecosystem carbon cycling requires absolute, not relative, estimates of soil CO_2 efflux. We describe a novel, automated efflux apparatus that can be used to test the accuracy of chamber-based soil respiration measurements by generating known CO_2 fluxes. Artificial soil is supported above an air-filled footspace wherein the CO_2 concentration is manipulated by mass flow controllers. The footspace is not pressurized so that the diffusion gradient between it and the air at the soil surface drives CO_2 efflux. Chamber designs or measurement techniques can be affected by soil air volume, hence properties of the soil medium are critical. We characterized and utilized three artificial soils with diffusion coefficients ranging from 2.7×10^{-7} to 11.9×10^{-7} m^2s^{-1} and porosities of 0.26 to 0.46. Soil CO_2 efflux rates were measured using a commercial dynamic closed-chamber system (Li-Cor 6400 photosynthesis system equipped with a 6400-09 soil CO_2 flux chamber). On the least porous soil, small underestimates (< 5%) of CO_2 effluxes were observed, which increased as soil diffusivity and soil porosity increased, leading to underestimates as high as 25%. Differential measurement bias across media types illustrates the need for testing systems on several types of soil media. (Eur. J. Soil Sci. 2004. 55:639–647)

SUSCEPTIBILITY OF POTTED SWEETGUM SEEDLINGS TO INSECT HERBIVORE DAMAGE AS INFLUENCED BY FERTILIZATION

Kenneth E. Ward and Mary Anne Sword Sayer

We report the influence of fertilization on the susceptibility of sweetgum (*Liquidambar styraciflua* L.) seedlings to naturally occurring insect herbivores. Thirteen-week-old potted sweetgum were placed in a pasture near the margin of a hardwood forest containing scattered sweetgum trees. Groups of 14 seedlings were treated weekly with either no (0), low (1.5 g/L), medium (3.0 g/L), or high (6.0 g/L) concentrations of 20-20-20 soluble fertilizer. Seedling performance was assessed by measuring height and leaf number and rating seedling condition throughout the 11-week experiment. Types and numbers of insect herbivores were recorded at 2- to 3-week intervals for each seedling throughout the experiment and cumulative damage was estimated for each seedling at the end of the experiment. Herbivore damage was generally light, except for weeks 2 through 5, when seven seedlings were defoliated and killed. Six of these seedlings were in the medium and high fertilizer treatments. Defoliations were due to late instar larvae of the yellowstriped armyworm (*Spodoptera ornithogalli* Gn.). Other insect herbivore species were detected, but their impacts were minor. Eleven seedlings received no detectable herbivore damage during the experiment; 10 of these received zero and low fertilizer treatments. Results suggest that the susceptibility of potted sweetgum seedlings to insect herbivore damage was associated with fertilizer concentration. This effect was not related to differences in seedling size because major defoliation events occurred before significant differences in seedling size among fertilizer treatments were detected. Yellowstriped armyworm has potential as a pest of sweetgum seedlings in intensively managed plantings. (2004. Res. Pap. SM-33. USDA Forest Service Southern Research Station, Asheville, NC. 7 pp.)

HISTOLOGICAL STUDIES OF *PHYTOPHTHORA RAMORUM* IN RHODODENDRON TWIGS

Friederike Pogoda and Sabine Werres

Freshly cut *Rhododendron* twigs were inoculated with *Phytophthora ramorum* S. Werres, A.W.A.W. de Cock & W.A. Man in 't Veld. Disease development (discoloration of the twigs) was observed. Tissue samples were taken for reisolation and for histological studies from four different zones of the inoculated twigs. Thin sections were stained with toluidine blue O. Reisolation of the pathogen was successful from all samples. The histological studies showed that *P. ramorum* was not only present in the brown zones of the *Rhododendron* twigs, but also in the healthy-looking green zones. Hyphae were found in different twig zones and in different tissues, but chlamydospores occurred only in brown twig zones where they developed mainly in the cortical parenchyma. Results from the histological studies provide a basis for how *P. ramorum* colonizes host tissue in *Rhododendron* twigs. (Can. J. Bot. 2004. 82(10):1481–1489)