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ARBORICULTURAL ABSTRACTS

SPREAD OF GYPSY MOTH (LEPIDOPTERA: LYMANTRIIDAE) AND ITS RELATIONSHIP TO DEFOLIATION

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Gypsy moth management is divided into three components: eradication, suppression, and transition zone management. All three components require knowledge of the boundaries that delimit these areas. Additional interest is also placed on the relationship between population spread and defoliation to prepare for the gypsy moth advance in new areas and minimize its impact. We developed relationships between advancing population boundaries, which were estimated using an algorithm implemented under the USDA Forest Service Gypsy Moth Slow-the-Spread Project and defoliation records collected by State and Federal agencies. We used current data from Wisconsin, West Virginia, and Virginia and historical data from the lower peninsula of Michigan. We observed that in West Virginia, Virginia, and Michigan, defoliation generally occurred in areas where moth abundance exceeded 300 male moths per pheromone-baited trap (i.e., the 300-moth population boundary), whereas in Wisconsin, it generally occurred between the 100- and 300-moth population boundaries. We also detected temporal changes in Michigan in the relationship between boundaries and defoliation, where the transition time between the 10-moth population boundary and defoliation was 4–5 years. Recent data from Wisconsin suggest a similar transitional time, whereas recent data from West Virginia and Virginia do not seem to contradict an earlier study suggesting a transition time of roughly 8 years. (Environmental Entomology 2005. 34(6):1448–1455)

URBAN LANDSCAPE CONSERVATION AND THE ROLE OF ECOLOGICAL GREENWAYS AT LOCAL AND METROPOLITAN SCALES

M. Margaret Bryant

Greenways are promoted for land conservation in both rural and urban areas, but less attention has been paid to the potential of greenways to serve urban biodiversity conservation goals. This paper presents results of a biodiversity planning study of a highly urbanized environment in Washington, DC (USA) that demonstrate the critical role of ecological greenways and parks in urban species conservation. The Cameron Run study raises fundamental questions about the way biodiversity is defined in urban areas, the scale of analysis required in heterogeneous urban environments, the role of sociocultural factors in urban biodiversity conservation, and the importance of regional greenway connections across the urban gradient. The Cameron Run study is a pilot project for an urban biodiversity information node (UrBIN) in the National Biological Information Infrastructure (NBII) program of the US Geological Survey (USGS). This paper draws connections between the rapidly expanding literature on biodiversity conservation and the smaller, but growing, body of research concerning the ecology of greenways and urban areas, and it does so through the lens of landscape planning. Findings on the Cameron Run watershed are reported, and biodiversity conservation in the watershed is discussed in the context of greenway efforts at local and metropolitan scales. (Landscape and Urban Planning 2006. 76(1–4):23–44)

THE IMPACT OF PARK TREES ON MICROCLIMATE IN URBAN AREAS

N.J. Georgi and K. Zafiriadis

Trees in cities have an important positive effect on people's lives. One such positive effect is the amelioration of microclimate. The aim of this research is to assess the correlation between parameters that affect the microclimate of parks during the summer. We measured air temperature, relative humidity and solar radiation in the sun and shade of the trees in urban parks in Thessaloniki, Greece. The results indicate that: the air (A) temperature reduction percentage (dTair%), air relative humidity increase (dTRh%), discontent index reduction percentage (DI%) (cooling effect) and solar radiation (L) percentage that passes through the trees' foliage to their shade creates an exponential function of $dA\% = a.e\text{-}bL$. These functions are also applicable to the limiting variation values of the parameters. If we use $L = 0$ (meaning Lightsh = 0, which is the case for an extremely dense tree), then the values that we expect from this particular parameter are the maximum possible. These maximum values are a characteristic feature of the parameter variation for this particular research area. These maximum values for the trees in the parks of Thessaloniki are: maxdTair% ≈ 24%, maxdRh% ≈ 41% and maxdDI% ≈16%. (Urban Ecosystems 2006. 9(3):195–209)

NITROGEN AVAILABILITY, LOCAL LIGHT REGIME AND LEAF RANK EFFECTS ON THE AMOUNT AND SOURCES OF N ALLOCATED WITHIN THE FOLIAGE OF YOUNG WALNUT (*JUGLANS NIGRA* × *REGIA*) TREES

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Early season leaf growth depends largely on nitrogen (N) provided by remobilization from storage, and many studies have tested the effect of N availability to roots on the amount of N provided for new leaf development by remobilization. Although it is well known that the light regime experienced by a leaf influences the amount of N per unit leaf area (LA), the effect of the local light regime on the amount of N derived either directly from root uptake or from remobilization for early season leaf growth has never been tested at an intracanopy scale. The objective of this study was to quantify the relative importance of (1) N availability to roots, (2) local light regime experienced by the foliage (at the shoot scale) and (3) leaf rank along the shoot, on the total amount of N allocated to leaves and on the proportions of N provided by remobilization and root uptake. To quantify the importance of N uptake and remobilization as sources of leaf N, potted hybrid walnut trees (*Juglans nigra* L. × *regia* L.) were grown outdoors in sand and fed with a labeled (^{15}N) nutrient solution. By removing the apical bud, the trees were manipulated to produce only two shoots. The experimental design had two factors: (1) high (HN; 8 mol N m^{-3}) and low (LN; 2 mol N m^{-3}) N availability; and (2) high (HL; 90% of incident photosynthetically active photon flux (PPF)) and low (LL; 10% of incident PPF) light. Total leaf N per tree was unaffected by either N availability or irradiance. The HN treatment increased the amount of leaf N derived from root uptake at the whole-tree scale (typically around 8 and 2% in the HN and LN treatments, respectively). Nitrogen allocation within foliage of individual trees was controlled by the local light regime, which strongly affected individual leaf characteristics as leaf mass per unit LA and area- based amount of leaf (N_a). Decreasing the light availability to a branch decreased the amount of N allocated to it, benefiting the less shaded branches. In contrast, shading of the lower branch did not affect the fraction of total leaf N remobilized for either the lower, shaded branch or the upper, unshaded branch. The relevance of these findings for tree growth modeling is discussed. (Tree Physiology 2006. 26(1):43–49)

PRINCIPLES OF PLANT HEALTH MANAGEMENT FOR ORNAMENTAL PLANTS

Margery L. Daughtrey and D. Michael Benson

Economic, environmental, and technological influences complicate the task of achieving disease-free products in the ornamentals industry. Integrated pest management (IPM) is a cornerstone of floriculture and nursery crop production: strategies include sanitation, clean stock, host resistance, and control through biological, cultural, environmental, chemical, and regulatory means. Sanitation measures and cultural controls must keep pace with new production technologies. Clean stock programs are used for many crops that are propagated vegetatively. Breeding, selection, and biotechnology provide crops resistant to pathogens. Offshore production for economic competitiveness can introduce pathogens that make regulatory programs necessary. New biocontrol and chemical products continue to improve control while meeting the requirement for minimal environmental impact. Continual introduction of new crops and new production technologies creates new opportunities for pathogens to exploit, such that new disease management tactics must be discovered and old ones rediscovered to achieve optimum health management for ornamentals. (Annual Review of Phytopathology 2005. 43:141–169)

PHYTOPHTHORA RAMORUM: INTEGRATIVE RESEARCH AND MANAGEMENT OF AN EMERGING PATHOGEN IN CALIFORNIA AND OREGON FORESTS

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Phytophthora ramorum, causal agent of sudden oak death, is an emerging plant pathogen first observed in North America associated with mortality of tanoak (*Lithocarpus densiflorus*) and coast live oak (*Quercus agrifolia*) in coastal forests of California during the mid-1990s. The pathogen is now known to occur in North America and Europe and have a host range of over 40 plant genera. Sudden oak death has become an example of unintended linkages between the horticultural industry and potential impacts on forest ecosystems. This paper examines the biology and ecology of *P. ramorum* in California and Oregon forests as well discussing research on the pathogen in a broader management context. (Annual Review of Phytopathology 2005. 43:309–335)