GROWING Points

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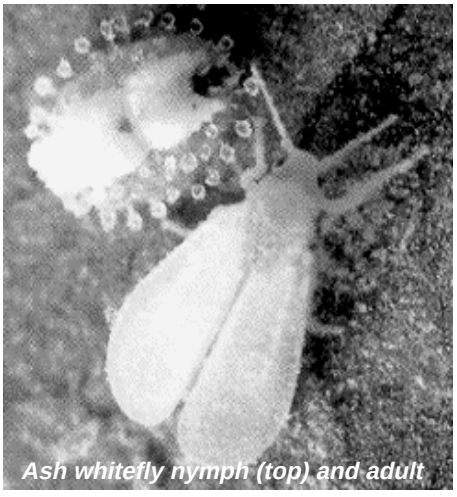
"New" Pests and Diseases Challenge Landscape Plants in California

by Linda Dodge, novice entomology/plant pathology enthusiast
reviewed by Steve Dreistadt, sr. writer, IPM Education & Publications

The trend toward a global economy has fostered a great increase in the exchange of goods among far-flung nations. Consumer demand in California and elsewhere for new and different landscape plants has led to increased importation of foreign nursery stock. These activities have provided opportunities for the accidental introduction of insect pests and, to some extent, diseases into regions far beyond their native ranges. As "exotic" pests in habitats free of their natural enemies, their populations can explode if compatible hosts are present and these organisms can become responsible for extensive economic loss.

This scenario has happened time and time again in California. Despite vigilant inspection of incoming goods including nursery stock and interception of the majority of potential pests at quarantine and border stations, a few pests manage to elude detection and develop into major problems for agricultural crops or landscape plantings in the state. A look at some of the past and present case histories of exotic pests and diseases affecting California's ornamental landscape brings to light the tireless efforts of researchers in our state to achieve timely solutions to these important problems. Their successful collaborations with scientists in the native countries of these pests to identify and introduce natural enemies demonstrate the power of the integrated approach to pest management.



Ash whitefly nymph (top) and adult

The Ash Whitefly

The ash whitefly (*Siphoninus phillyreae*) was first detected in southern California (and North America) in 1988, although the large extent of the infestation suggested that it may have been around since 1986. It is not a true fly but more related to aphids and the flying adults resemble tiny moths with yellow bodies and wings covered in white wax. The immature stage of the insect, called a nymph, does damage to plant leaves by sucking out the carbohydrate-rich phloem sap, causing leaves to turn yellow, shrivel and fall off. The ash whitefly was found to have a broad host range, infesting many species of ash along with olive, lilac, redbud, crape myrtle, pomegranate, toyon, apple, crabapple, peach, pear, and citrus. In addition to defoliation which could kill young trees, the heavy infestations produced copious amounts of sticky honeydew, a sugary secretion that subsequently became colonized by unsightly black sooty mold.

Without any natural enemies to keep it in check, the ash whitefly spread quickly throughout southern California and, by 1991, its range included most of California and parts of Nevada, Arizona and New Mexico. On warm days, the adults took to the air in great clouds resembling wind-borne snow and the areas beneath infested trees were coated in a thick, sooty goo.

The ash whitefly is native to the Mediterranean region and the Near East. In those areas, several insect species have developed that prey on this whitefly and

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prevent populations from building to high levels. In 1989, researchers from California universities and state agencies collaborated with scientists in Italy and Israel to import two of these natural enemies- a tiny parasitic wasp (*Encarsia inaron*) that lays its eggs in whitefly nymphs which later hatch and devour the nymphs from within and a small type of lady beetle (*Clitostethus arcuatus*) which feeds on the nymphs directly. These insects were reared in California laboratories, released in southern California in 1990 and, by the next year, the ash whitefly population had decreased to levels that were scarcely detectable.

Today, the ash whitefly is an established resident of California, Arizona, Nevada and New Mexico. Its natural enemies have also become established in these areas and control whitefly populations so it is no longer a pest problem.

Oleander Leaf Scorch

In 1995, a new disease was discovered affecting oleanders in southern California landscapes. Leaves on mature plants developed a scorched appearance beginning at the tips and moving down the leaf margins. These symptoms resembled drought stress but occurred in well-irrigated situations and subsequent to very wet winters. The disease symptoms usually progressed to include die-back of twigs

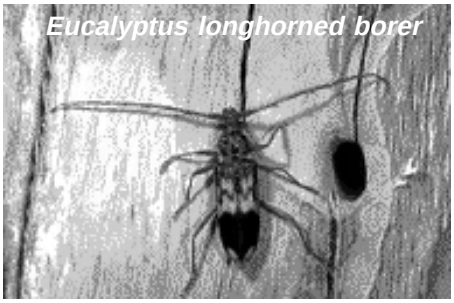
and branches and ended in death of whole plants within about two years of showing symptoms. Oleander leaf scorch, as it came to be known, showed potential for extensive damage to landscape and freeway plantings.

Because the symptoms resembled two well-known diseases in California, almond leaf scorch and Pierce's Disease of grapevine, researchers suspected a similar pathogen was responsible for this new malady of oleanders. They were able to isolate an oleander-specific strain of the xylem-dwelling bacterium, *Xylella fastidiosa*, from diseased oleander tissue. These findings were puzzling, however, because the presence of *Xylella* strains in the state has been documented since the time of the original settlers who tried to grow grapes here. Why should this disease be of only recent occurrence on oleander?

The answer to this question became apparent with the detection of a new insect in southern California in 1994 that was also subsequently identified from collections taken as early as 1989. This new insect was identified as the glassy-winged sharpshooter (*Homolodisca coagulata*), a larger version (up to half an inch long) of leafhopper with piercing, sucking mouthparts and an appetite for the juices of at least 73 different plant species, including oleander. The glassy-winged sharpshooter is native to the southeastern United States and its eggs have been routinely intercepted and excluded during quarantine inspections of nursery stock from those states. It is suspected that egg-infested plant material may have escaped detection on one or more occasions and populations of this exotic pest in southern California have subsequently increased. In 1998, the glassy-winged sharpshooter was collected in Kern Co., indicating the spread of this insect into California's southern Central Valley.

The glassy-winged sharpshooter is known to be a vector of plant disease in its native areas, capable of taking in bacteria while feeding on infected plants, harboring the bacteria in its body and transferring them to healthy plants during subsequent feeding. This is the suspected scenario taking place in southern California, although the origin of a strain of bacteria unique to oleander is still unclear.

Research on methods for controlling populations of the glassy-winged sharpshooter and, thereby, limiting the spread of oleander leaf scorch has been ongoing since 1996. The potential for biological control exists in the form of a small wasp that has been seen parasitizing eggs in California. Work is in progress with researchers in Florida and Louisiana to identify other natural enemies of the sharpshooter for introduction into California. Differences in susceptibility to the leaf scorch disease have been observed among oleander cultivars so the possibility of introducing genetic resistance may exist. Greenhouse studies have shown two soil-applied systemic insecticides to be effec-



tive to the extent that they may kill the feeding sharpshooters before they have a chance to transmit the bacterial pathogen. Techniques for pruning oleander shrubs to discourage spread of the insects are also being studied. It is hoped that these efforts will result in a pest management success story similar to that of the ash whitefly.

Pests of Eucalyptus on the rise

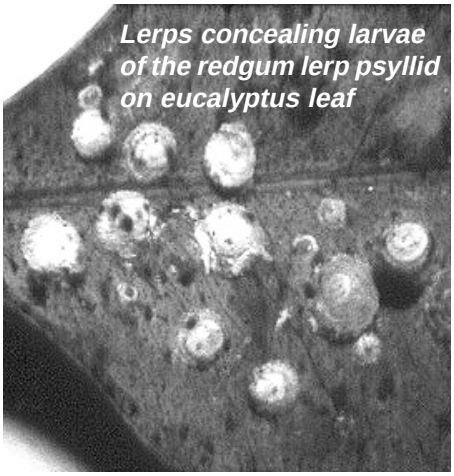
Eucalyptus has been much admired and much maligned as a landscape and timber tree ever since its introduction into California in the mid-1850's. Today more than 90 species of eucalyptus are grown in California and make a significant contribution to the landscape. One of this Australian native's most redeeming features has been its lack of damaging pests. Since 1983, however, eleven different insect species have made their way from Australia to California and found their favorite eucalyptus food source served up by the thousands. A steady stream of beetles, borers, weevils, wasps and psyllids (aphid-like insects) has washed over the state and taken a toll on the health of many eucalyptus plantings. Three pests of recent introduction and concern are the longhorned borer, the Australian tortoise beetle and the redgum lerp psyllid.

There are actually two introduced species of longhorned borers that infest eucalyptus in California. One has been known in the state since 1984 and attacks mainly the trunk of trees (*Phoracantha semipunctata*) while the other species was

first detected in 1995 and prefers the upper branches (*Phoracantha recurva*). The adult beetles can be up to one inch long and the females lay eggs in bark crevices. The hatching larvae chew their way through the bark and feed on the living cells of the cambium layer, often girdling and killing the host tree in a matter of weeks. They bore farther into the wood to complete their development and emerge as adults to begin the next generation. Drought stress makes trees more vulnerable to borer attack while larvae are unable to chew their way into the bark of well-irrigated trees. Chemical control of these insects proved economically impractical but several natural enemies were found in Australia and introduced into California. Four species of minute wasps, one which parasitizes borer eggs and three that attack the larval stage are showing promise for control. Good cultural practices such as deep infrequent irrigation, pruning during winter months when borers are less active and keeping cut logs and dead wood away from live trees are also essential to an integrated program for borer management.

A recent addition to the arsenal of eucalyptus pests is the Australian tortoise beetle or eucalyptus leaf beetle (*Trachymela sloanei*), which was collected for the first time in North America in Riverside and Orange counties in 1998. This relative of the lady beetle is one-quarter inch long in the adult phase and is a strong flier with the potential to spread rapidly. Both the larvae and adults feed at night on the leaves of eucalyptus and cause considerable defoliation of trees although the full extent of their impact is yet unknown. Researchers are already evaluating a wasp, which parasitizes eggs of a similar beetle pest of eucalyptus in South Africa, for its potential as a biological control agent for the Australian tortoise beetle in California.

The redgum lerp psyllid (*Glycapsis brimblecombei*) is yet another newly recognized exotic pest of eucalyptus in California. These small relatives of aphids and mealybugs were first documented in both southern and northern California in 1998. What caught the eye of entomologists were thousands of white dome-shaped structures one eighth of an inch in diameter covering the foliage of redgum eucalyptus trees. These structures are termed "lerps" (an Australian aboriginal word) and are protective coverings made of crystallized honeydew under which are psyllid larvae feeding on the sap of eucalyptus leaves. There are several stages of larvae which eventually develop into winged adults able to disperse and lay eggs on new host trees. Severe infestations can lead to significant leaf drop and weakening of trees, making them vulnerable to attack from other insects such as the longhorned borer. The sticky honeydew excreted by the psyllids can be a nuisance on pavement beneath trees and often becomes stained with black sooty mold. These pests seem to be moving to other species of eucalyptus in California but some species are being avoided. The redgum lerp psyllid is being attacked by several predators, including two species of introduced ladybeetles, lacewing larvae, minute pirate bugs, spiders and mites. These predators have not, however, decreased psyllid populations enough to be considered effective biological control agents. Researchers are currently evaluating potential predators, parasites and pathogens in the insect's native habitat with the goal of introduction of one or more into California in the near future.



Lerps concealing larvae of the redgum lerp psyllid on eucalyptus leaf

An important aspect of waging war on exotic insect pests and diseases should be emphasized. The introduction of natural enemies or biocontrol agents is a carefully monitored process that can take several years. The ecology of the pest of interest in its native habitat must be studied so that effective predators, parasites and pathogens may be identified. If an effective natural enemy is found, a quarantine screening process is conducted to determine its potential effects on California's native fauna and flora. Populations of the natural enemy must be increased to levels that will impact the pest of interest. Release of these populations must be done at carefully selected locations and their activities must be subsequently monitored to determine the degree of success in reducing pest numbers over time. All of these activities, along with continual detection and exclusion of potential pests, are carried out by state, university and cooperative extension scientists with a remarkable record of achievement for safeguarding California's agriculture and landscape.

The end results of these efforts are rarely complete eradication of exotic pests. Instead, the pests become permanent residents along with their natural predators and parasites. Natural enemies provide total biological control in some cases, such as the ash whitefly, and no further human action is required. In other situations where natural enemies provide only partial biological control, these agents combined with judicious use of pesticides and good cultural practices may be needed to hold pest populations to tolerable levels.

This material was adapted from the following resources:
California Plant Pest and Disease Report, CDFA Plant Pest Diagnostics Center, various volumes
Pests of Landscape Trees and Shrubs, UC IPM Project, DANR Pub. 3359
Various reports on research supported by the Elvenia J. Slosson Fund for Ornamental Horticulture

For more information on the subject of landscape pests and diseases, check out these web sites:

UC Statewide IPM Project
http://www.ipm.ucdavis.edu/
oleander leaf scorch, sharpshooters
http://www.cnr.berkeley.edu/xylella/index.html
PestWeb-pest control industry web site
http://www.pestweb.com/
American Phytopathological Society
http://www.scisoc.org/
UC Davis Center for Pest Management Research and Extension
http://www.envtox.ucdavis.edu/cpmre/

Restoration and the Cultivation of Nature Focus of Upcoming Colloquium

by Kat Anderson, Ethnoecologist
USDA Natural Resources Conservation Service
National Plant Data Center

Ecological restoration represents perhaps the most profound change in our relationship to the land since the invention of agriculture. This new research field will be the topic of discussion at an **upcoming colloquium to be held on September 28th from 8:00 am to 6:00 pm at the Main Theater on the UC Davis campus.**

The aims of the colloquium are threefold: (1) To clarify thinking about what restoration is and its relationship to other related activities such as horticulture, arboretum management, natural area stewardship, and land rehabilitation; (2) To explore the relationship between restoration and various forms of agriculture, considering both what restoration can learn from traditional forms of agriculture such as forestry, agronomy, and range sciences, and what agriculture can learn from restoration; (3) To explore the value of restoration as a context for integrating disciplines, including disciplines outside agriculture and the natural sciences, and also integrating academic with indigenous and place-based forms of knowledge.

The colloquium speakers will be some of the top leaders in the restoration movement. After welcoming remarks, the day begins with a keynote address by **Dr. William Jordan III,** editor of *Ecological Restoration*—who will discuss the sensibilities of agriculture and restoration and the value of dialogue between them. He will also touch upon the relationship between restoration and other restorative forms of land management.

Next, farmer and maverick **John Anderson** will discuss how wildlands and agricultural fields can be reconnected by restoring native plant communities within existing systems of roadsides, field borders, irrigation canals, tailwater ponds, and natural drainages. He will stress that good agriculture occurs inside of nature and he will give examples of the many valuable interactions that occur between farmer's fields and surrounding wildlands: from the wild and weedy relatives that interchange their genes; to the "good" insects that overwinter in the riparian corridor and feed on the "bad" insects in the crop field; to the bees, beetles, birds, and flies that pollinate the crops.

Lillian Vallee, a professor in the Literature and Language Arts Department at Modesto Junior College will talk about how restoration as a cultural activity works not just to build community but also fosters a poetry of place by nourishing the literary imagination. The presentation will illustrate how actual and imaginative restoration provides poets/writers with language to articulate land memory, rituals of purification, and "the self as menagerie."

In the afternoon, **Dennis Martinez**, founder of the Indigenous Peoples Restoration Network will explore pre-Columbian land management and agricultural practices of Native Americans—defining the ancient linkages between cultivating wild nature and domesticated agriculture. He will stress that restoration can be an attempt to re-create and re-experience both historic landscapes and traditional ways of relating to the landscape.

Stephen Packard of the National Audubon Society and coeditor of the *Tallgrass Restoration Handbook*, will be the final speaker, highlighting the practice of restoration in a community setting, relying on over twenty years of experience restoring tallgrass prairies, oak savannas and woodlands north of Chicago. Examples of community-based, volunteer-driven restoration will be given, emphasizing that restoration can be a way of learning and building community.

The conference is open to the public. The cost is $35 general and $15 for students. After September 13th, the cost goes up to $50 general and $30 for stu-

Harry Kohl Endowment gains momentum

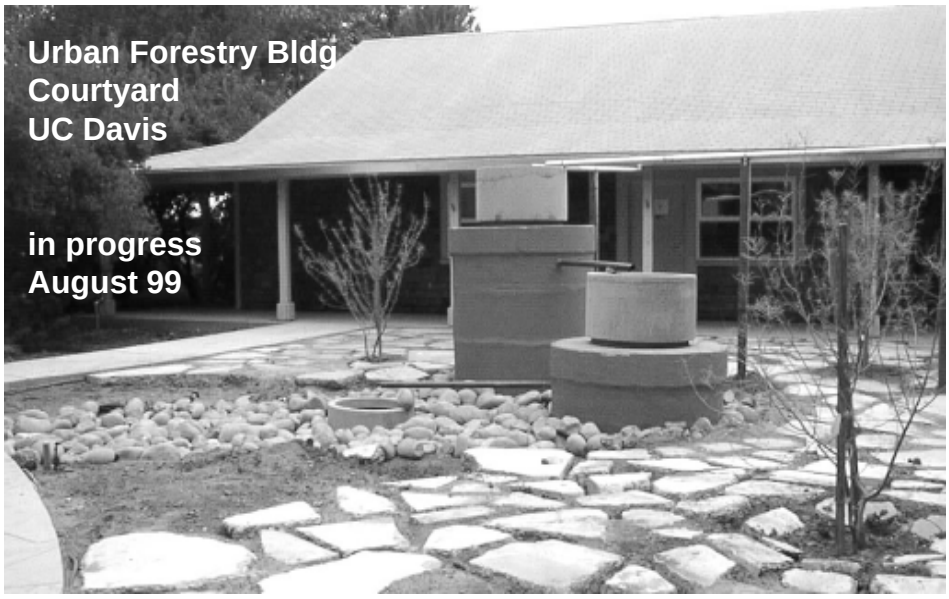
Dr. Harry C. Kohl was one of Environmental Horticulture's most productive and engaging professors. His career with the University of California spanned 36 years, officially, and 46 years if the ten years of his retirement are counted during which he continued to publish, collaborate with colleagues and tend his plants on a daily basis. Whether it was long-stemmed, scented cyclamen; short-crop seed-propagated Easter lilies; or carnations requiring less disbudding, Dr. Kohl was full of ideas to benefit the floriculture industry. His sense of the university as community led him to become a self-taught videographer and participate actively in the Emeritus Association's project devoted to producing taped interviews documenting the careers of distinguished emeriti.

After his death in September of 1996, the Environmental Horticulture Department established an endowment in Dr. Kohl's honor. The intent is to provide support for graduate students in the department. Donations received so far total $6,435. The department wishes to thank the following people for their generous gifts: Donald and Gloria Bath, CA & ES Dean's Office, Spencer Davis, Herbert Dunmeyer, Sandra Fielden, Susan and Alan Fishleder, the Fleming family, Wyn Floyd, Glen Forister, Hines Nursery, Frances Kofranek, Anton Kofranek, Harry Laidlaw, Andrew Leiser, Richard Merritt, Robert Miller, Barbara Monroe, Robert Nelson, Barbara Nichols, Elizabeth Oakman, Claudio Pasian, Michael Reid, William Scheublein, Joyce Stanford/Lynne Segura, Margaret Shannon, Minnette Summers, Anthony Tse, Martha Werth and John H. Werth.

Additional donations may be made to the U. C. Davis Foundation and sent to the Department of Environmental Horticulture, University of California, One Shields Ave., Davis, CA 95616.

dents. In conjunction with the colloquium, there is a photographic exhibit by talented **Roman Loranc** that beautifully displays the various habitats and ongoing restoration efforts in the Great Central Valley.

The colloquium is also sponsored by UC Davis' College of Agricultural and Environmental Sciences; Department of Environmental Horticulture; the Davis Arboretum; Department of Native American Studies; Nature and Culture Program; Division of Humanities, Arts, and Cultural Studies, College of Letters and Science; and the Natural Resources Conservation Service. **For more information contact Conference and Event Services at (530) 757-3331 or check out the web site at http://envhort.ucdavis.edu/young/nature/**



Progress on Urban Forestry Sustainable Courtyard Landscape

In the Winter 1998 issue of *Growing Points*, Greg McPherson of the US Forest Service's Western Center for Urban Forest Research and Education, outlined the design for the courtyard of the new Urban Forestry/Landscape Ecology/Forest Genetics building at the Environmental Horticulture department. The goal of the project, according to Dr. McPherson, was "to demonstrate through design, management and monitoring that sustainable landscapes can regulate energy and materials flow, thereby improving environmental quality".

As of the summer of 1999, the courtyard project is well underway and is proving to be aesthetically pleasing as well as potentially sustainable. Funding from Teichert Construction Company and the Stice Family Endowment has made it possible for department staff as well as student workers to install key design elements.

As seen in the photo, the two concrete cisterns are in place along with the aquaducts that will harvest rain water from the building's roof and direct it to an underground storage tank capable of holding up to 50 % of the courtyard's needed irrigation water. There are sand filters on top of the cisterns to filter out particulates and some pollutants from the water draining off the roof, thereby improving its quality before storage. A solar-powered pump is installed in the below-ground cistern to draw on the stored water for irrigation use or flood control.

The cobble-filled dry swale has been constructed leading from the cisterns to a vine-covered area away from the building. The swale's main function is to divert overflow from the cisterns to an area where it can infiltrate slowly into the soil. This will also allow removal of sediment and some pollutants from the runoff water as well as on-site detention of storm water thereby aiding in flood control for the immediate area.

Porous pavement in the form of salvaged concrete covers about 30 % of the courtyard's area. This provides a walking surface and reduces the need for irrigation. Drought-tolerant groundcovers and grass will be planted between the pavers. Due to its light color, the concrete surface will reduce heat gain to the area in warm summer months. The porous nature of the pavement allows for infiltration of rainfall into the soil resulting in reduced runoff. The use of recycled construction debris lessens the amount of material sent to local landfills.

The plant material chosen for the courtyard will satisfy the goals of reduced water use and microclimate control. The Formosan flame trees have been replaced by three 'Desert Museum' hybrid palo verde trees. Hybrid between Blue Palo Verde (*Cercidium floridum*) and Mexican Palo Verde (*Parkinsonia aculeata*), these deciduous desert natives will provide cooling filtered shade in the summer and allow light penetration during the winter. Additional drought-tolerant groundcovers and grasses will be installed to provide a pleasing, yet low-maintenance, landscape.

The forestry courtyard project is intended to be a demonstration of what can be done on a residential scale to reduce water use, improve water quality, provide microclimate and flood control and aid in recycling efforts. A **dedication ceremony** including a demonstration of simulated "rainfall" and roof runoff collection courtesy of the UCD Fire Dept. is planned for **12-2 pm on October 20**. The public is invited. Call the Western Center for Urban Forestry Research and Education at **530-752-7636 for more information.**

-Linda Dodge

Notes From the Chair...

By Dave Burger

Congratulations are in order for those graduating from the Environmental Horticulture and Urban Forestry program in 1999. They include **Erin Bacich, Monica Bally-Urban, Sue Cortrite, Michael Inaba, Jonas Moe, Alyssa Moran, Kirsten Reese, Rich Taber, Christopher Von Rueden and Vincy Wu**. Congratulations must also go out to those graduate students finishing advanced degrees in this academic year. They (and their major professors) include **Jim Bouldin (PhD - Plant Biology, Barbour), Michelle Geary (PhD - Plant Biology, Barbour), Carol Gregory (MS - Geography), Diana Hershey (MS - Geography, Young), Lin-Ying Li (PhD - Ecology, Lieth), John Roncoroni (MS - Horticulture, Wu), Carmen Garcia-Navarro (MS - Horticulture, Evans) and Seanain Snow (MS - Horticulture, Evans)**. Those students due to turn in their theses any day now are **Kris Kiehne and Rosa Valle**.

EH is currently playing host to a sizable and cosmopolitan group of visiting scholars and postdocs. **Michael Raviv** from Israel is working with Heiner Lieth and me on water relations of roses. **Don Hunter** from New Zealand is working as a postdoc with Michael Reid. **Hak Ki Shin** from South Korea, **Juan Antonio Fernandez Hernandez** from Spain and **Kiran Menon** from India are visitors to Heiner Lieth's lab, working on roses. **Jose Magalhaes** from Brazil and **Maria Christina Ubach** from Portugal have been working in Don Durzan's lab for sometime. **Marilu Carter** is serving as interim Landscape Specialist for Cooperative Extension. **James McKenna** will soon be working as a post-graduate researcher with **Wes Hackett**, emeritus professor recently retired from the University of Minnesota.

In July, **Heiner Lieth** was the recipient of the California Association of Nurserymen's Research Award at their annual convention in Lake Tahoe. This award is "presented to an individual for research work of specific benefit to the nursery industry". **Michelle Gadd**, a student in the Ecology Graduate Group, was one of four recipients of the U. S. Fulbright Grant for International Study and Research Abroad for the 1999-2000 academic year. Michelle will spend a year in Botswana studying how elephants affect local vegetation. Congratulations to both Heiner and Michelle!

Various grants have been awarded recently to EH faculty and affiliates. **Heiner Lieth** received $15,000 from the California Association of Nurserymen for the project "Studies on the Effects of Salinity on Plant Growth Using Continuous Monitoring of Soil Electrical Conductivity" and another $15,000 from the Horticultural Research Institute to study "Optimization of Fertilization Practices under Tensiometer-Based Irrigation of Nursery Crops". **Michael Reid** received $45,000 from the American Floral Endowment for the third year to collaborate with Terril Nell of the University of Florida on re-evaluating postharvest handling practices for cut flowers. **Wes Hackett** was awarded $15,258 by the Walnut Marketing Board to study "Stockplant Manipulation to Enhance Rooting and Nursery Survival of Walnut Cuttings". **Dave Neale** and **Claire Kinlaw** of the Institute of Forest Genetics, a US Forest Service research group housed at EH, will direct a major grant for $1,000,000 from the National Science Foundation to study wood formation in loblolly pine.

The **Slosson Research Endowment Fund** for projects relating to horticulture and gardening has awarded funding totaling $443,334 to several studies led by EH faculty and affiliates for the 1999-2000 cycle. Project titles, principal investigators and awards include:
Selection and Propagation of Deep-Rooted Ornamental Trees for Urban Environments (**Dave Burger, Greg McPherson**- $19,050), Support for the Ornamental Horticulture Research and Information Center: Extending Slosson-Supported Programs and Providing Administration Infrastructure (**Dave Burger, Linda Dodge**- $21,200), Assessing the Influence of Irrigation and Treeshelters on the Root Development of Three California Native Oak Species (**Larry Costello, Douglas McCreary**- $6,700), Study of California Native Grass and Landscape Plant Species for Recycled Water Irrigation and Use in California Landscape and Gardens (**Lin Wu**- $22,000), Molluscicidal Nematodes for Biological Control of Pest Slugs (**Henry Kaya**- $19,150), Breeding and Selection of Hybrid *Cantuas* for Inland Valleys of California (**J. Giles Waines**- $20,000), Evaluation and Demonstration of Corn Gluten Meal as an Organic Herbicide (**Cheryl Wilen, Dave Shaw**- $16,615), Rootstocks for 'Difficult' Plants: Rhododendrons, Azaleas and Grevilleas (**Michael Reid, Ellen Zagory**- $12,000), Evaluation of Low-Chill Deciduous Tree Fruit Cultivars (PartI): Peaches (**Daniel Hagillih**-$3,500), A Home Demonstration Garden for the UC Davis Arboretum (**Kathleen Socolofsky**- $18,900), Survey of Commercial Sources of Mycorrhiza Inocula for Horticultural Use (**Richard Evans**- $2,790), UC Botanical Garden New Plants Program (**Ellen Simms, David Brunner, Martin Grantham**- $19,677), Evaluation of Pruning as a Method to Reduce Damage by Oleander Leaf Scorch (**Marcie Grebus, Mike Henry**- $9,880), Biological Control of a Newly Introduced Pest, the Eucalyptus Tortoise Beetle, *Trachymela sloanei* (**Jocelyn Millar, Timothy Paine, Mark Hoddle**- $19,166), Competitive Influence of Phosphorus Fertilizer on *Oxalis corniculata* in tall fescue (*Festuca arundinacea*) and Perennial Ryegrass (*Lolium perenne*) turf (**Clyde Elmore, John Roncoroni**- $19,166), Gardening With Youth Educational Program (**Chuck Ingels**- $10,960), Survey to Determine the Baseline Nitrogen Leaf Concentration of Twenty-Five Landscape Tree Species (**Ed Perry, Gary Hickman**- $6,390), Garden Site and Education Program Development for the UC Davis Children's Garden Program at the Plant Science Teaching Center and Student Farm (**Gale McGranahan, Eric Zilbert**- $19,500). Congratulations to all.

Profiles in Environmental Horticulture

Michael Parrella, Professor and Chair, Department of Entomology, UC Davis

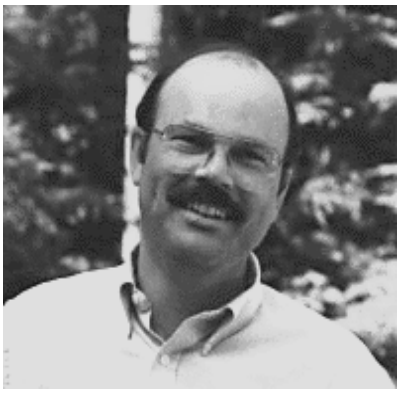
Management of insect pests on ornamental plants has always been a high priority for the horticulture industry. Because much of the value of these crops derives from their appearance, there is little tolerance for the presence of insects or the damage they leave behind. Combine this challenge with the trends toward the use of reduced-risk chemical pesticides and the incorporation of biological control methods into integrated pest management programs and you have the essence of Dr. Michael Parrella's research interests as professor and current chair of the Entomology Department at UC Davis. Dr. Parrella has a courtesy appointment in the Environmental Horticulture Department at UCD and his expertise in ornamental pest management is a valued part of the department's curriculum and outreach efforts.

Along with his research staff and many students, Dr. Parrella has worked closely with the cut flower and nursery industries in California to develop feasible integrated pest management (IPM) programs for control of such formidable pests as western flower thrips (WFT), silverleaf and greenhouse whiteflies, Liriomyza leafminers, green peach and melon aphids, and spider mites. In Dr. Parrella's words, these IPM studies focus on the "basic biology and ecology of a plant pest at both the individual and population levels" and seek to understand "the relationship of the pest to the crop, to the environment and to its natural enemies". His group's work on IPM strategies for WFT and twospotted spider mite in greenhouse cut roses was featured in the Fall 1998 edition of *Growing Points*.

Dr. Parrella enjoys financial support from a variety of granting agencies and his annual research budget is over $150,000. One of the ongoing projects in his lab is evaluation of reduced risk pesticides. These chemicals are designed to target specific pests, be of little or no hazard to worker health and safety, and have minimal impact on the environment. Each compound is screened for efficacy using greenhouse and laboratory colonies of whiteflies, leafminers, WFT and aphids. In addition, the materials are tested for their effects on natural enemies and biological control agents of these pests. If the chemical being evaluated is harmful to beneficial insects, its use in an IPM program is precluded.

On the level of basic research, Dr. Parrella's interests lie in exploring the underlying principles of biological control of plant pests. The high aesthetic value placed on ornamental crops leaves little tolerance for pest injury, thereby dictating very low threshold pest levels on which to base IPM programs including natural enemies. The ideal biological control agent must be effective early in the crop cycle when prey density is low enough to be acceptable. The greenhouse environment is well suited to this type of study, where both prey and predator densities can be controlled and followed over time to evaluate the potential of a natural enemy as a biological control agent.

Dr. Parrella joined the UC faculty in 1980, first in the Entomology Department at the Riverside campus and later relocating to the Entomology Department at Davis, where he currently serves as department chair. He earned a B.S. degree in Animal Science at Rutgers University in 1974 and pursued graduate study in Entomology at Virginia Tech, receiving his doctorate in 1980. To prospective students, Dr. Parrella says: "If you find that becoming part of a very dynamic program in a strong department on a great campus in the heart of the environmental horticulture industry in the US is exhilarating, I look forward to talking with you."



James MacDonald, Professor and Chair, Department of Plant Pathology, UC Davis

The horticulture industry spends countless dollars annually in the fight against plant diseases. Successful marketing of high-value ornamental plants demands little or no tolerance of damage due to disease pathogens. Providing the industry with the knowledge and tools to efficiently manage and even prevent plant diseases has been the goal of Dr. Jim MacDonald ever since he joined the faculty of UC Davis' Department of Plant Pathology in 1978. Dr. MacDonald also holds a courtesy appointment in the Department of Environmental Horticulture, where he participates in teaching courses in Nursery Production, Container Soils, Turf Culture, and Analysis of Horticultural Problems.

Dr. MacDonald's research interests include root diseases, soil microbiology, diseases of ornamental plants and the role of environmental stress in the development of plant disease. A key area of study for his research group has been the function of various environmental stresses in the development and severity of Phytophthora root rots. This water-borne mold continues to plague the container nursery industry, and Dr. MacDonald's work focuses on creating sound, research-based management practices to minimize the impact of this disease. The principal stresses he has emphasized include drought, poor root aeration, heat and salinity. The work done in his laboratory relating to salinity stress collectively represents the first systematic study of the interaction between this important cause of plant stress

and the severity of root disease.

Another area of study for Dr. MacDonald's research group is the adaptation and deployment of new diagnostic and pathogen detection technologies into the nursery industry. These are being developed in the form of various disease-specific quick test kits that horticulture professionals can use in the field. The goals of this research have been to enhance the ability of growers to make informed pesticide decisions, to reduce the use of pesticides in nurseries, and to introduce the principles of IPM into nursery disease management programs.

Most recently, Dr. MacDonald has become involved in research that addresses the problems of pathogen transmission in recirculating irrigation water, and alternatives to methyl bromide. In both programs, he is exploring the application of novel technologies (excimer lasers, radio frequency power, etc.) to these difficult problems.

Dr. MacDonald currently is serving as chair of the Department of Plant Pathology. Within the American Phytopathological Society (APS), an organization of plant pathology professionals, Dr. MacDonald has been a member of the Diseases of Ornamental Plants and Turf Grasses committee, Secretary/Treasurer for the Pacific Division, and Associate Editor for the journal *Plant Disease*. He currently is serving as a Senior Editor for APS Press and Assigning Editor for *Plant Disease Notes*. He is the chair of the APS Electronic Technology Advisory Committee, and is working to establish APSNet (the Society's World Wide Web site at http://www.scisoc.org/) as a focal point for information dissemination to APS members, and a vehicle for electronic publications.

Dr. MacDonald's association with UC Davis spans almost thirty years. He received his B.S. in Plant Pathology in 1973 and a PhD. in the same discipline in 1978. He has been a faculty member of that same department since 1978.

Entomology Department on the web at:
http://entomology.ucdavis.edu/
Plant Pathology Department on the web:
http://www.plpnem.ucdavis.edu/Index.htm

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Anyone wishing to receive *Growing Points* may be placed on the mailing list by contacting the editor as noted below. There is no subscription charge.

The eXtension Files

Recent inquiries to the EH Department...

Mr. K. D. of Shingle Springs writes: "What plants are suggested for fire-retarding landscapes in the foothill and chapparal areas of California?"
This is a timely question given the hundreds of thousands of acres that have gone up in flames this summer. Fire is a natural component of the foothill and chapparal communities and much of the native vegetation is "built to burn" and then regenerate from seed or crown sprouting. These areas have become desirable for human habitation and fire suppression is now the order of the day. Many regulations are in place to mandate the clearing of vegetation from around homes. Replacement of the flammable native vegetation with other species that are less prone to ignition or that have low fuel volume is encouraged by many agencies. The Forest Service states that native vegetation can remain to some extent if thinned and pruned to create separation between plants. Research concerning replacement plants has focused on species with low volume and height and, therefore, low heat output, as well as some degree of fire retardance. Species of iceplant, aloe, saltbush and sedum top the lists for plantings close to structures. Creeping sage (*Salvia sonomensis*) has shown promise in test plantings but, as yet, is not widely available. Well-irrigated turf can also provide a defensible space around vulnerable homes. An excellent reference is the book by Maureen Gilmer entitled *California Wildfire Landscaping* (1994, Taylor Publishing Co., Dallas, TX) which covers ordinances, site analysis, managing native vegetation, appropriate ornamental plantings and what to do when fire comes. Several organizations have web sites with similar information including the California Department of Forestry (http://www.fire.ca.gov/) and the California Fire Safe Council (http://www.firesafecouncil.org/).

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