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CO-HORT

INSIDE THIS ISSUE

Update on *Xylella fastidiosa* in Landscape Plant Hosts

Xylella fastidiosa (*Xf*) is a xylem-limited, insect-vectored plant pathogen that can cause severe damage to a wide range of host plants. Diseases caused by this pathogen include Pierce's Disease of grapevine (PD), oleander leaf scorch (OLS) and almond leaf scorch (ALS). A series of studies designed to better understand the impact of *Xf* on the urban landscape is being conducted by a University of California Riverside team of Frank Wong, Extension Urban Plant Pathology Specialist and Donald Cooksey, Bacteriologist. In 2003, they initiated a survey of landscape plants in five urban locations in southern California to document the incidence of *Xf* infection in landscape ornamental hosts and to characterize strains existing in these hosts that may prove a threat to landscape ornamentals or crops of agronomic importance. Ten isolates of *Xf* were obtained from eight plant species not previously described as hosts of *X. fastidiosa* in southern California.

Targeted sampling of host species testing positive by ELISA was performed in 2004 primarily in the Riverside and Redlands areas in order to obtain additional isolates for characterization. To prove the role of *Xf* in causing disease in previously identified hosts, test plants have been inoculated in glasshouse experiments to fulfill Koch's postulates for these isolates and to determine if they are able to cause disease in grapevine and oleander.

The results of the study indicate there are 13 landscape species symptomatic of *Xf* disease that harbor different strains of *Xf* in southern California. Of the new isolates characterized, it appears that new hosts have been identified for some *Xf* strain groups: Pierce's disease (magnolia, peach, western redbud), oleander leaf scorch (magnolia, jacaranda, day lily), mulberry leaf scorch (heavenly bamboo), and almond leaf scorch (ginkgo, crape myrtle, sweet gum, olive, purple-leaved plum, western redbud). Table 1 details the current status of confirmation and identification of *Xf* strains causing symptoms in

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Table 1. Current status of the identification of *Xylella fastidiosa* strains in landscape hosts.

Species	Common Name	Strain ID	Status
Ginkgo biloba	Maidenhair Tree or Ginkgo	*multiplex* subspecies	Koch's postulates not completed using mechanical inoculation, but bacteria consistently associated with symptomatic plants by ELISA, PCR and direct culturing
Lagerstroemia indica	Crape Myrtle	*multiplex* subspecies	
Liquidambar styraciflua	Liquidambar	*multiplex* subspecies	
Olea europaea	Olive	*multiplex* subspecies	
Prunus cerasifera	Purple-leafed plum	*multiplex* subspecies	
Cercis Occidentalis	Western Redbud	*multiplex* subspecies	
Morus alba	White Mulberry	MLS	Koch's postulates completed; MLS definitely found in California
Nandina domestica	Heavenly Bamboo	MLS	Koch's postulates not completed using mechanical inoculation, but bacteria consistently associated with symptomatic plants by ELISA, PCR and direct culturing
Hemerocallis	Day Lily	*sandyi* subspecie	Koch's postulates not completed using mechanical inoculation, but bacteria consistently associated with symptomatic plants by ELISA, PCR and direct culturing. Isolates from Day Lily, Jacaranda and Magnolia caused scorch symptoms when inoculated into Oleander test plants
Jacaranda mimosifolia	Jacaranda	*sandyi* subspecie	
Magnolia grandiflora	Southern Magnolia	*sandyi* subspecie	
Nerium oleander	Oleander	*sandyi* subspecie	Previously established as a host
Cercis occidentalis	Western Redbud	*fastidiosa* subspecie	Koch's postulates not completed using mechanical inoculation, but bacteria consistently associated with symptomatic plants by ELISA, PCR and direct culturing
Prunus persica	Peach	*fastidiosa* subspecie	
Magnolia grandiflora	Southern Magnolia	*fastidiosa* subspecie	

Notes: strain ID performed by sequence analysis of 16S-23S rDNA Intergenic Spacer Region (ISR) sequences and RAPD-DNA. MLS=Mulberry leaf scorch

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landscape hosts. Seven additional landscape plant species (see Table 2) have been observed with *Xf* symptoms and have tested positive for *Xf* via ELISA and PCR, but researchers have not been able to isolate *Xf* from them. Thus, it is unclear that *Xf* is actually causing disease in these species.

Sources:

Costa, H. S. 2004. Incidence of *Xylella fastidiosa* in Landscape Plants. Turf and Landscape Institute, Dec. 15, 2004, Ontario, CA.

Wong, F. 2005. Personal communication.

Wong, F., D. A. Cooksey, and H. S. Costa. 2004. Documentation and characterization of *Xylella fastidiosa* Strains in Landscape Hosts. CDFA Pierce's Disease Control Program Progress Report.

Table 2. Symptomatic landscape plant species in southern California from which ELISA and PCR tests for *X. fastidiosa* were positive, *Xylella* was present but we were not able to isolate.

Scientific Name	Common Name
Juglans	walnut
Lavandula dentata	lavender
Chionanthrus retusus	Chinese fringe tree
Phoenix reclinata	Senegal date palm
Phoenix roebelenii	pygmy date palm
Rosmarinus officinalis	rosemary
Albizia julibrissin	silk tree

Irrigation Practices in Ventura County Nurseries

By

Julie P. Newman

As part of a $3.5 million dollar grant, the UCCE Clean Water Team (Julie Newman, Ben Faber, Kristine Gilbert, Michi Yamamoto, Eric Green, Laosheng Wu, Jay Gan, Don Merhaut, and Richard Evans) has been working with the woody ornamental nursery and floriculture industries to mitigate nutrient and pesticide runoff from production sites. In the process of monitoring water quality and developing Best Management Practices (BMPs) to meet the needs of the diverse industry, a survey was developed to evaluate current cultural practices directly associated with irrigation management, water treatment programs, and runoff issues. Ventura County nursery managers were asked to complete a 142-question survey, *"Checklist for Assessing and Mitigating Runoff in Greenhouses and Nurseries,"* compiled by the UCCE Clean Water Team. There are approximately 140 wholesale production nursery operations in Ventura County, and the returned surveys so far represent half of that group.

The following article summarizes the results from the irrigation and leaching portions of the questionnaire, which represent a "snapshot" of the types of systems and management practices used by county flower and nursery growers.

Monitoring water quality. Most nursery managers understand the value of testing the irrigation water before it is applied and use this information to help maintain good plant health, avoid problems associated with poor water quality, and develop appropriate fertilizer management programs. Irrigation water quality is monitored by two-thirds of Ventura County nurseries, although only about half of the nurseries keep records.

Irrigation maintenance. Most nurseries regularly maintain their irrigation systems, including inspecting for leaks, flushing clogged lines and emitters, and cleaning filters. However, less than one-third of the nurseries periodically evaluate irrigation uniformity.

Irrigation uniformity and distribution. A uniformity evaluation measures the capability of an irrigation system to evenly deliver water. Systems with low uniformity will typically over-water some plants to provide adequate water to other plants. This is one area where improvements could be made. For example, in an earlier UC study of six Ventura County nurseries with overhead systems, only one nursery had distribution uniformity over 80%. In addition, pressure compensating emitters are only used in one-third of the nurseries; pressure differences at the top and bottom of the slope are compensated for in less than half of the nurseries with sloped terrain. Maintaining appropriate system pressure is an important step in increasing overall irrigation uniformity. The majority of the nurseries who use overhead irrigation only do so in areas where pots or plants are spaced closely to minimize the potential of runoff and groundwater contamination from watering bare areas. However, one-third of the nurseries that use overhead systems are unable to deliver uniform irrigation without creating overspray on walkways and edges. Although many nurseries still rely on hand-watering, most do so with the use of an on-off mechanism to prevent runoff. Most nursery managers properly correlate emitter use with plant type and pot size to avoid contributing to runoff. The majority of nurseries that use spray-stakes and drippers also use appropriate flow rate for each watering zone to manage the area to make sure each stake/dripper is in a pot, and if it is not, to make sure that it is turned off.

Irrigation scheduling. Most nurseries correlate irrigation schedules with plant moisture requirements but do not modify schedules based on evapotranspiration (ET), solar radiation, or other collected environmental data. Measuring water use by weighing pots or measuring soil moisture with tensiometers or other instruments is typically not used. Over 90% of the nurseries maintain staff that is specifically trained in irrigation scheduling, and most rely solely on staff experience to judge when to water. Half of the nurseries use time clocks, and most managers regularly adjust them to correlate irrigation schedules with environmental conditions and plant growth stage. Automatic timers are useful in implementing more complicated irrigation schedules such as pulse irrigation, a practice that can reduce the applied water by irrigating in smaller increments that are more effectively used by plants. However, pulse irrigation is used in less than 10% of the nurseries.

Container leaching. Leaching is necessary to flush excess salts from the root zone, but excessive leaching or leaching too frequently will contribute to runoff and groundwater contamination. Only about half of the nurseries use EC of root media or leachates to determine leaching practices as part of the irrigation schedule. Less than half of them set irrigation schedules to perform leaching at specific irrigation events rather than every time they irrigate. The optimum amount of leaching is 10-15%, but only one-fifth of nurseries report that they measure the leaching amounts.

Conclusions. By maintaining a uniform irrigation system, proper scheduling and proper leaching,

surface and groundwater pollution can be reduced. To help growers improve irrigation techniques, we are conducting quarterly water quality educational meetings, many of which address irrigation management. Currently, CORF is conducting a series of six irrigation seminars, three in English and three in Spanish. The Clean Water Team is also providing irrigation information at on-site visits to local nurseries. Next year, at the end of the current program, nursery managers will again be asked to take the survey so that improvements in irrigation management can be documented.

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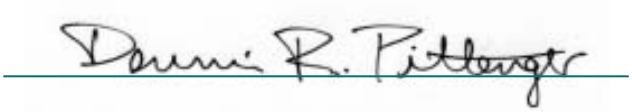

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