Table 1. Occurrence of Oleander Leaf Scorch (percentage of total plants) as detected by visual assessment or diagnostic laboratory tests (ELISA and culturing on PW medium) on nine sampling dates.

	Sampling Date								
	4-97	6-98	8-98	12-98	3-99	6-99	9-99	12-99	7-00
Visual assessment									
Pruned	N/A	25.0	37.5	100	95.8	100	96.0	100	100
Unpruned	N/A	87.5	54.2	91.7	95.8	100	100	100	96.0
LSD (p=0.05)	N/A	23.0*	29.2	11.6	22.6	0	8.4	0	8.4
Laboratory tests									
Pruned	54.2	37.5	83.3	91.7	83.3	87.5	100	100	N/A
Unpruned	54.2	79.2	83.3	91.7	95.8	95.8	100	100	N/A
LSD (p=0.05)	29.7	26.5*	22.1	16.4	17.7	16.3	0	0	N/A

* Indicates difference is significant.

Evaluation of Pruning as a Method to Reduce Damage by Oleander Leaf Scorch

Marcella E. Grebus and J. Michael Henry

Introduction

A common concern of homeowners and landscape managers is how to prolong the life or appearance of oleanders infected with Oleander Leaf Scorch (OLS), the devastating new bacterial disease attacking oleanders in southern California. Presently there is no effective prevention or cure for OLS. This project examined the effect of the cultural treatment, pruning, on the development of OLS. The objective was to evaluate the effect of pruning on disease development, symptom exhibition and life span of: 1) oleanders with the disease; and 2) those free from the disease, but growing with infected plants and likely to be infected due to the presence of insect vectors (the glassy-winged sharpshooter, in this case).

In Citrus infected with the citrus strain of *Xylella fastidiosa,* pruning has been observed to greatly reduce the development of symptoms over a two-year period. Experience in grapes has shown that pruning tools are not likely to spread the disease. For these reasons, an experiment was devised to test the hypothesis that yearly moderate pruning has a beneficial effect on the survival of oleanders infected with, or likely to be infected with, the bacteria *Xylella fastidiosa*.

Materials and Methods

A block of field-grown oleanders at the University of California South Coast Research and Extension Center in Irvine, California was selected as a favorable test site. In 1997 the plants were close to ten years old and were growing in an area where the insects and disease were first noticed in Orange County. They were arranged in four hedgerows each containing 12 plants. This group of 48 unpruned plants was divided into 24 pairs and evaluated for infection by the *Xylella fastidiosa* organism before beginning the pruning treatments. Twenty-four plants were already infected with the disease and twenty-four were free of the disease.

The experimental site was not irrigated until early spring of 2000 when new drip irrigation lines were added. Drip lines were placed 5 feet on either side of the shrub rows with emitters one-foot on center. Deep irrigation was applied every two weeks until the end of the study, August 1, 2000.

The pruning treatments were done in June 1997, and during October of 1998. Branches that were originally sampled for the bacterial infection determination were flagged with colored tape. This tape was moved lower on the same branch if the pruning treatment removed the distal portion of that branch. The pairs of plants in each treatment group were separated by 4' x 8' sheets of 1/2" plywood to avoid intertwining branches being treated by mistake.

In addition to the laboratory tests to determine bacterial infection, a visual rating system was used to observe the plants at three-month intervals. The visual rating was based on the amount of leaves that showed symptoms of leaf tip and marginal browning (scorch or necrosis) and ranged from no visible disease symptoms (0), to one or more leaves showing marginal necrosis (“D”) to severe symptoms (numerous dead or marginally-scorched leaves) or dead plant (“HD”). The pruning was done using hand loppers or pruning shears sani-

TABLE 2. List of Extension Presentations by Researchers, 1996 - 1999.

Date	Presenter	Title & Location
Spring 1996, 1997, Winter 1998-	M. Henry, UCCE Advisor, Riverside & Orange Co.	UNEX Class presentations on OLS and Sharpshooter (total of 30 students)
March 14, 1996	M. Henry, UCCE Advisor, Riverside & Orange Co.	UCR Symposium, OLS (80 attended)
March 15, 1996 -	M. Henry, UCCE Advisor, Riverside & Orange Co.	Tours of Coachella Valley & Orange Co to view infestation of Sharpshooters and incidence of OLS. (20 attended each)
9/24/96	M. Henry, UCCE Advisor, Riverside & Orange Co.	Presentation on OLS and Sharpshooter (350)
1997	M. Grebus, Asst. UCCE Plant Pathologist, UCR	Provided information to newspaper articles on Oleander Leaf Scorch to the Orange County Register, The Riverside Press Enterprise, the Los Angeles Times, and picked up by other papers in San Bernardino and San Diego counties.
1/15/97	M. Henry, UCCE Advisor, Riverside & Orange Co.	Presentation on OLS and Sharpshooter (180)
May 9, 1997)	M. Grebus, Asst. Extension Plant Pathologist, UCR	Invited talk, "Oleander Leaf Scorch", Committee on Sustainable Agriculture Sustainable Landscape and Gardening Conference, Encinitas, CA
1997	M. Grebus, Asst. Extension Plant Pathologist, UCR	Provided information for the article "Sharpshooter spreads Oleander Leaf Scorch" in Southwest Trees and Turf 2 (6), June 1997.
June 3, 1997	M. Grebus, Asst. Extension Plant Pathologist, UCR	Participant, Sigma Xi Science Day, Presented "A new bacterial disease of oleander plants" to students from three high schools.
9/1997	M. Henry, UCCE Advisor, Riverside & Orange Co.	Costa Mesa, CA; CCN Pro nursery in-service training for California Assoc. of Nurserymen
October 24, 1997	M. Grebus, Asst. Extension Plant Pathologist, UCR	Invited talk, "Update on Oleander Leaf Scorch and how other plants may be affected", California Association of Nurserymen's Western Ornamental Horticulture Research Conference, Sands Expo Center, Las Vegas, NV. Also presented a poster on Oleander Leaf Scorch.
November 12, 1997	M. Grebus, Asst. Extension Plant Pathologist, UCR	Invited talk, "Oleander Scorch: a new disease affecting Oleander in Southern California", Landscape Disease Symposium, Oak View, CA.
November 25, 1997	M. Grebus, Asst. Extension Plant Pathologist, UCR	Invited talk, "Identification and detection of Oleander Leaf Scorch", a two-hour interactive, hands-on presentation in grades two through five, for the "Girls Exploring Math and Science" program, Redwood School, Fontana, CA.
12/8/97	M. Henry, UCCE Advisor, Riverside & Orange Co.	Farm Advisor training presentation on OLS and Sharpshooter,(25)
1998	M. Grebus, Asst. Extension Plant Pathologist, UCR	Worked with UC/DANR Communication Services Broadcast Unit to produce the UC Radio News entitled "Southern California Freeway Plants Succumbing to Disease-Carrying Insect". UC Radio News releases are sent to 62 radio stations including USDA Radio in Washington, DC and Agri-Net Radio in Yuma, AZ (a regional network consisting of 30-plus stations in both states). The release was aired in 1998.
January 15, 1998	M. Grebus, Asst. Extension Plant Pathologist, UCR	Invited talk, "Oleander Leaf Scorch Pathology", Pesticide Applicators Professional Association (PAPA), California Convention Center for the Arts, San Diego, CA (PCA credits were awarded).
2/4/98	M. Henry, UCCE Advisor, Riverside & Orange Co.	Presentation on OLS and Sharpshooter (45 attended)
May 6, 1998	M. Grebus, Asst. Extension Plant Pathologist, UCR	Invited talk, "Oleander Leaf Scorch", a two-hour class for the Riverside County UC Master Gardener Program, UCR Botanic Gardens.
May 8, 1998	M. Grebus, Asst. Extension Plant Pathologist, UCR	Invited talk, "Oleander Leaf Scorch", Community Associations Institute (CAI) meeting, Del Webb's Sun City, Palm Desert, CA.
May 13, 1998	M. Grebus, Asst. Extension Plant Pathologist, UCR	Invited talk, "Oleander Leaf Scorch, a new disease", Ohio University, Athens, OH
9/18/98	M. Henry, UCCE Advisor, Riverside & Orange Co.	Presentation on OLS and Sharpshooter 300
1999	M. Grebus, Asst. Extension Plant Pathologist, UCR	Contributed text and photos of Oleander Leaf Scorch to the upcoming Ortho Problem Solver.

tized by dipping in a 10% bleach solution between treatment pairs. The oleander plants were pruned two times. The treated (pruned) plants were cut back to the height and width of the plywood panels. This level was considered moderate, with leaves remaining on most branches. The growth of pruned oleanders had essentially stopped by summer of 1998, so pruning treatments were not administered in 1999.

Disease determination samples from four branches on each plant were designated for leaf sampling. Two sample sites were harvested on each side of the plant. Initial samples prior to treatment were taken in April 1997. The results are reported in Table 1. The fresh leaf samples were evaluated using the ELISA test and plate culture methods. This determination was done a total of nine times over the study (Table 1).

The ELISA tests were done using commercially produced test kits. The kits used were specific for *Xylella fastidiosa* (from AgDia Incorporated, Elkhart, IN). The plate tests were done on PW agar and incubated in the dark at 77°F. Cultures were examined in 10-14 days.

Results and Discussion

The laboratory tests showed that visual evaluation of oleanders is an unreliable means of determining if the plants are infected. In some cases, the visual rating did not tell the whole story. For instance, a healthy-looking, robust oleander could be infected with *Xylella fastidiosa* (OLS), but be free from visible disease symptoms for many months. Table 1 compares the visual plant ratings with more reliable laboratory tests on leaf samples. On plants with the majority of their leaves and branches clearly scorched the visual rating more closely agreed with the laboratory test results.

In Table 1 the disease incidences of plants that were pruned are not noticeably different *(p=0.05)* from those of unpruned plants, with the exception of 6-98 (visual and lab). In this exception the pruning treatment had lower disease incidence. Comparing the visual data with laboratory results, detection of diseased plants was lower in the visually detected plants than in the lab tested on 8-98 but there was no difference thereafter. At 7-25-00 eight plants were dead, five of those pruned and three of those unpruned.

The addition of regular irrigation did not result in visual symptom decrease during the six-month period of application. The final rating (7-25-00) varied little from the previous visual evaluation.

Conclusion

Pruning plants did not affect disease incidence or development. Both pruned and unpruned plants became diseased with Oleander Leaf Scorch. The only significant effect of pruning was an early transient lower disease incidence both by visual observation and laboratory testing of pruned vs. unpruned oleander plants. Plant mortality was assessed on July 25, 2000 and there was no significant (p=0.05) difference between the number of pruned vs. unpruned plants that died from Oleander Leaf Scorch.

Because visual observations of symptoms may not give an accurate determination of infection in early stages of disease development, laboratory tests on leaf tissue are likely to provide more reliable information.

Continuing observations of local highway plantings and landscapes planted with oleanders gives no reason to question the conclusions of this study. Both pruned and unpruned plants exhibit extensive symptoms in many affected areas throughout southern California.

Delivery of research results and information about this disease has been made by the authors over the course of this study. Table 2 lists educational activities of the authors and others related to OLS in California. This study has helped dispel the notion that pruning diseased oleanders will cause them to recover.

Publications on OLS

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