Figure 1. The glassy-winged sharpshooter (Homalodisca coagulata)

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

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The new disease known as Oleander Leaf Scorch has spread throughout southern California Oleanders for the past several years. It is caused by a bacterium, *Xylella fastidiosa,* that clogs the xylem tissue resulting in drought-like symptoms and eventual death of Oleanders. The bacteria are inserted into the xylem cells during feeding by leafhopper insects, specifically the glassy-winged sharpshooter (*Homalodisca coagulata*) (Figure 1) and the smoke tree sharpshooter (*Homalodisca lacerta*). The disease is very dependent on the vectors for infection and spread, thus most research has been directed at the vector, rather than the bacterial infection in the plants.

While work to control the insect by the use of systemic insecticides and with the introduction of parasitic wasps is taking place, there is no known cure for the bacterial disease. This study was conducted to evaluate the potential for slowing or eliminating the bacteria from the plants by pruning off all young growth or terminal growth where the insects are found feeding on the stems. Observations with another strain of this bacterial disease that infects citrus in Brazil have indicated that pruning may have some positive effect on plant survival. (Dr. Alex Purcell, personal observations).

This disease organism has been a serious problem in many agricultural crops throughout the world and has been the subject of numerous unsuccessful research efforts to find a cure over the past one hundred years. This cultural study, therefore, seemed to be an appropriate and reasonable project for the funding available.

Methods and Materials

A block of field grown Oleanders at the University of California South Coast Research and Extension center in Irvine, California was selected as the most favorable test site (Figure 2). 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 planted 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 experiment. Twenty-four plants were already infected with the disease and twenty-four were free of the disease.

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 (Figure 3). 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 number of leaves showing symptoms of leaf tip and marginal browning (scorch or necrosis) and ranged from no

Figure 2. Oleander plants on the test site at the South Coast Research and Extension Center in Irvine, CA

Figure 3. Branches originally sampled for the bacterial infection determination flagged with colored tape.

visible disease symptoms to one or more leaves showing marginal necrosis ("D") to severe symptoms (numerous dead or margin-scorched leaves) or dead plant ("HD").

The pruning was done using hand loppers/ cutters sanitized by dipping in a 10% bleach solution between treatment pairs. The Oleander plants were pruned in June 1997 and October 1998. 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.

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 fresh leaf samples were evaluated using the ELISA test and plate culture methods. This determination was done a total of six times over the study.

The ELISA tests were done using commercially-produced test kits specific for *Xylella fastidiosa* (AgDia Inc., 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 percentages of diseased plants were consistent, except for dates 6-98 (visual and lab), 8-98 (visual), and 3-99 (visual) where the pruned treatment resulted in lower disease (Table 1). Visual detection generally resulted in lower values for disease occurrence than did the lab tests.

The investigators of this project realize that there is no easy way to characterize the disease levels for these plants. We have found that in some cases, the sample does not tell the whole story. For instance, a healthy, robust-looking Oleander may be infected with Leaf Scorch, but visual disease symptoms may take months to become noticable, as shown in the leaf sample evaluations (Table 1). In contrast, a plant may be much declined, with the majority of its leaves and branches clearly scorched. Both of these plants would be scored as positive for Leaf Scorch using our reporting methods.

Conclusion

The investigators for this project conclude that aggressive pruning may be helpful to the homeowner who appears to have a problem with Oleander Leaf Scorch. The effect of pruning may be observed when the numbers of diseased plants sampled differ from the numbers for pruned and unpruned treatments. In this study, the pruned plants appear clearly healthier than those not pruned, most noticable prior to the 12-98 sampling (Table 1).

This study also addresses the differences in data between two methods of estimating plant health: visual data and ELISA and culturing on PW. With the

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 six sampling dates

	Sampling date					
Treatment	**4-97**	**6-98**	**8-98**	**12-98**	**3-99**	**6-99**
Visual assessment						
Pruned	N/A	25.0	37.5	100	95.8	100
Unpruned	N/A	87.5	54.2	91.7	50.0	100
LSD	N/A	23.0*	29.2	11.6	22.6*	0
Laboratory tests						
Pruned	54.2	37.5	83.3	91.7	83.3	87.5
Unpruned	54.2	79.2	83.3	91.7	95.8	95.8
LSD	29.7	26.5*	22.1	16.4	17.7	16.3

* indicates difference is significant

exception of the harvest of 8-98, the visual data are similar to the laboratory results. However, the symptoms of Oleander Leaf Scorch may be confused with symptoms of water stress, chemical damage, or plant burn. These problems all tend to cause Oleander plant samples to show marginal leaf scorching. Laboratory testing of plants that have marginal browning is recommended. Laboratory tests confirm the presence or absence of the pathogen, which in some cases may prevent drastic measures from being taken with healthy Oleanders.

The continuation of this study will provide information on long-term effects of the pruning treatment as compared to the non-pruned plants. We anticipate that as this study yields results there will be a pattern in symptom progression of Oleander Leaf Scorch, as well as plant mortality. It may be that pruned plants can survive longer than those left unpruned.

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