

# Management of Orchid Pests with Silwet® L-77 and Horticultural Oils<sup>1</sup>

R. A. Cating, A. J. Palmateer, M. A. Hoy, and R. Gazis<sup>2</sup>

Orchid popularity has experienced continual growth in the United States, and orchids are the second most popular potted plant behind poinsettia (Jerardo 2007). Orchids are susceptible to numerous arthropod pests, which can be difficult to control. Common arthropod orchid pests that are frequently encountered by hobbyists are the boisduval scale (*Diaspis boisduvalii*) and several mites, most commonly the twospotted spider mite (*Tetranychus urticae*) and several flat mites (Tenuipalpidae), including the orchid mite (*Tenuipalpus orchidarum*), the phalaenopsis mite (*T. pacificus*), and the oncidium mite (*Brevipalpus oncidii*) (Johnson 2008, 2010).

Most orchid hobbyists use synthetic organic pesticides when treating plants for arthropod infestations. However, many orchids are sensitive to chemical pesticides, and damage to the plants and flowers can occur. Also, health concerns and the development of pest resistance to many pesticides make less toxic arthropod control options desirable, especially for hobbyists or small commercial growers.

UF/IFAS researchers evaluated the ability of Silwet® L-77, a surfactant used to increase the spread and wettability of pesticides, to improve the efficacy of horticultural oils in controlling boisduval scale and mite infestations in orchids. Initial experiments were performed to determine if Silwet® L-77 alone caused damage to orchids under greenhouse

conditions. Representatives of seven genera were tested: *Dendrobium*, *Oncidium*, *Doritaenopsis* (*Phalaenopsis* hybrids), *Paphiopedilum*, *Epidendrum*, *Cymbidium*, and *Cattleya*. No phytotoxicity was observed to foliage, roots, stems, buds, or flowers on any of the orchids tested at temperatures between 21.0°C and 35.0°C (69.8°F–95.0°F) with relative humidity between 45% and 95% (Figure 1).



Figure 1. Some of the orchids used in the phytotoxicity study: A) *Dendrobium*, B) *Phalaenopsis*, C) *Paphiopedilum*, and D) *Cattleya*. No evidence of phytotoxicity was observed on the foliage, roots, flowers, or buds of any of the plants.

1. This document is PP287, one of a series of the Plant Pathology Department, UF/IFAS Extension. Original publication date November 2011. Revised April 2018. Visit the EDIS website at <http://edis.ifas.ufl.edu>.
2. R. A. Cating, faculty research assistant, Hermiston Agricultural Research & Extension Center, Oregon State University; A. J. Palmateer, courtesy professor, Plant Pathology Department, UF/IFAS Tropical Research and Education Center; M. A. Hoy, eminent scholar and Davies, Fischer and Eckes professor of biological control, Department of Entomology and Nematology; and R. Gazis, assistant professor, Plant Pathology Department, UF/IFAS TREC; UF/IFAS Extension, Gainesville, FL 32611.

The Institute of Food and Agricultural Sciences (IFAS) is an Equal Opportunity Institution authorized to provide research, educational information and other services only to individuals and institutions that function with non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, marital status, national origin, political opinions or affiliations. For more information on obtaining other UF/IFAS Extension publications, contact your county's UF/IFAS Extension office.

U.S. Department of Agriculture, UF/IFAS Extension Service, University of Florida, IFAS, Florida A & M University Cooperative Extension Program, and Boards of County Commissioners Cooperating. Nick T. Place, dean for UF/IFAS Extension.

After initial tests indicated that the tested plants were not susceptible to phytotoxicity, researchers obtained plants from several commercial growers in Florida that were infested with either boisduval scale (Figure 2) or flat mite. Oil + Silwet® L-77 reduced scale density more so than water control or oil alone (Figures 3–5), while mortality rate of scales that were not removed by the spray increased from 39% to 47% with oil alone and from 86% to 93% with oil + Silwet® L-77. Similarly, when treating *Dendrobium* orchids that had flat mite infestations, the number of mites significantly decreased when using oil + Silwet® L-77 as compared to using oil alone. (To view the complete paper, visit <http://journals.fcla.edu/flaent/article/view/76056>.)

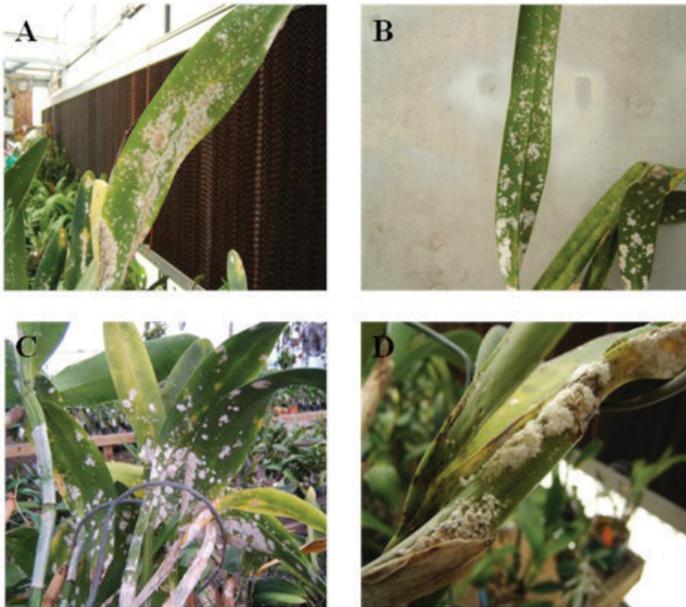


Figure 2. *Cattleya* orchids before treatment with water, oil, or Silwet® L-77 + oil were heavily infested with boisduval scale.



Figure 3. *Cattleya* orchid after being treated with water had high populations of boisduval scale.

Results indicate that the addition of Silwet® L-77 to horticultural oils significantly increases its efficacy over oil alone when treating plants for boisduval scale or flat mite infestations, and it may work well for other arthropods. Directions for using oil + Silwet® L-77 are given below using measurements suitable for homeowners.



Figure 4. *Cattleya* orchid after being treated with horticultural oil; boisduval scale infestation is reduced, but still evident on several of the leaves.

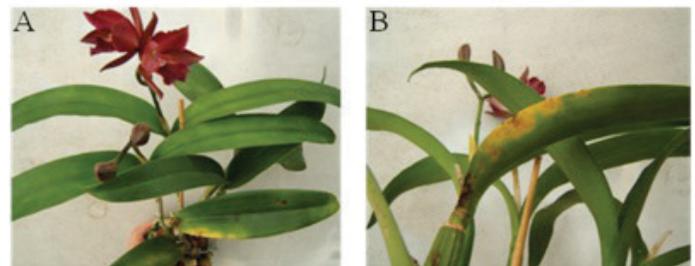


Figure 5. *Cattleya* orchid after treatment with horticultural oil + Silwet® L-77; no boisduval scales are evident on leaves, inflorescences, or pseudobulbs, although feeding damage from the scales is visible on several leaves.

## Mixing Oil + Silwet® L-77

1. Mix horticultural oil with water according to directions.
2. Add Silwet® L-77 at 0.05%. A syringe or other device to measure such small amounts is helpful when measuring this amount of liquid. See Table 1 for assistance with measurements.

## Applying Oil + Silwet® L-77 to Plants

1. Although no phytotoxicity was observed on the orchids used in this study, other genera and intergeneric hybrids may exhibit phytotoxicity symptoms after treatment. Care should be taken when treating plants for the first time. It

is recommended that an individual plant be tested before spraying large groups of similar plants.

2. One hundred percent coverage is crucial. All aerial parts of the plants should be treated, both upper and lower leaf surfaces, all the way down to the potting mix. Roots also can be treated if pests are present, such as mealybugs that sometimes can be found on roots.
3. Because no residual chemicals are left on the plants, it is important to monitor pest populations after treatment and re-treat when necessary, according to the oil manufacturer's recommendations.

## Other Considerations

1. Due to the sensitivity of some orchids, it is recommended that plants be sprayed early in the day when it is cooler. Although no phytotoxicity was observed on the orchids in this study, heat increases the risk of damage when using oils.
2. There are reports in the literature of increased incidence of bacterial diseases when using Silwet® L-77. Therefore, if the growing area has a history of bacterial diseases or if it is suspected that bacterial diseases may be present, use with caution (i.e., use early in the day to minimize leaf wetness, remove all symptomatic plants, and treat for bacterial diseases).

## References

- Jerardo, A. 2007. "Floriculture and nursery crops yearbook." *Economic Research Service, US Department of Agriculture*. Accessed April 2018. <http://usda.mannlib.cornell.edu/usda/ers/FLO-yearbook/2000s/2007/FLO-yearbook-10-04-2007.pdf>
- Johnson, P. J. 2008. "Mites on Cultivated Orchids." Accessed September 2009. <http://www.sdstate.edu/ps/Severin-McDaniel/orchid-pests/upload/Mites-on-Cultivated-Orchids.pdf>.
- Johnson, P. J. 2010. "Boisduval Scale on Orchids." Accessed August 2009. <http://www.sdstate.edu/ps/Severin-McDaniel/orchid-pests/upload/Boisduval-scale-on-orchids2.pdf>.

Table 1. Measurement chart for oil + Silwet® L-77 using measurements suitable for orchid hobbyists.

Volume of oil + water <sup>1</sup>	Silwet® L-77 0.05% v:v		
	Use any one of the following converted amounts		
	mL	Ounces	Teaspoons
1 gallon	1.9	0.06	0.4
3 gallons	5.7	0.2	1.2
5 gallons	9.5	0.3	2.0
7 gallons	13.3	0.4	2.7
10 gallons	19	0.6	4.0

<sup>1</sup>To mix oil and water, follow the oil manufacturer's directions.