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Managing Rose Rosette in the Landscape — Ideas Based on Experimental Data

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Figure 1. A. In this planting of 'The Fairy' near the State House in Columbia, SC, 100% of the roses were symptomatic for rose rosette disease. B. The virus that causes rose rosette disease and is responsible for its spread is the eriophyid mite, *Phyllocoptes fructiphilus*. Note the mite is wingless and has four legs. We have found that just 10 grams of rose tissue may contain hundreds to thousands of eriophyid mites.

ROSE ROSETTE DISEASE, caused by rose rosette virus and vectored by the eriophyid mite *Phyllocoptes fructiphilus* (*Figure 1*), destroys thousands of roses in rose gardens each year. Some rosarians have abandoned roses as a hobby because their roses have been destroyed by this disease. Rose rosette disease continues to be found in new areas of the United States. The total number of cases and the rate of spread of the disease are not well documented.

When rose rosette enters a planting of roses, the pattern of spread usually follows a clumped distribution pattern. Plants nearest an infected rose are more likely to become infected and symptomatic for rose rosette. In a large rose garden, symptomatic plants may be found downwind from the initially infected plant. Over time as more plants become infected, the pattern of spread may appear more random. However, the initially clumped distribution leads to the first suggestion for management of this disease. Plants should be inspected at least weekly for initial symptoms (*Figure 2*) of rose rosette disease. When symptoms are detected, the plant should be removed immediately to eliminate a source of eriophyid mites that may carry the virus to other plants in the garden. The suggested way of plant removal is to:

(1) bag the plant with a large contractor size garbage bag;

(2) cut the plant loose at the ground line and remove the bagged plant;

(3) dig up and remove the root ball (bagging is not necessary since the mites are not soil borne); and

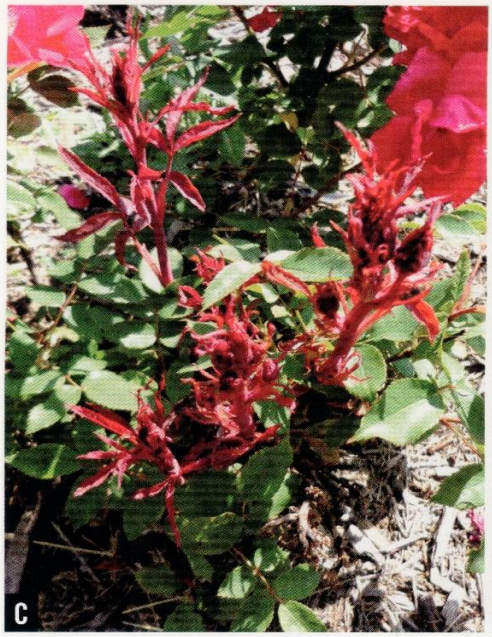
Figure 2. Initial symptoms of rose rosette disease include A. increased thorniness; B. thickened stems and distorted flower buds (note how sepals are elongated); and C. strapped or thin leaves. D. Rosettes (witch's broom) are thought of as the classic symptom of rose rosette disease, but at this stage, mites are most likely "ballooning" to other plants, and rouging the plant will have less value than rouging at the outbreak of initial symptoms.

(4) destroy the rouged plant material by burning or transporting the material to the landfill — do not compost the material.

A new plant can be placed in the same hole seven days later as the mite is not thought to survive more than five days off of a rose bush (J. Arwine, personal communication).

Wingless mites, such as *P. fructiphilus,* float passively in air currents (ballooning) and cannot control where they land. Barriers such as buildings, fences, large nonhost plants, etc., may impede eriophyid mites from reaching a host. We used green barriers of *Miscanthus sinensis* to determine if a barrier would reduce incidence of rose rosette disease in rose plots. Barriers reduced rose rosette incidence by 77 percent. Although barriers reduced the rate of spread of the virus and may explain why some roses escape rose rosette disease, the green barriers could not prevent the introduction of the disease into the plots. This research indicates that rose rosette may spread more slowly in small plots separated by nonhost or other barriers.

Pruning of a cane symptomatic of rose rosette disease has been used by numerous rosarians in an attempt to salvage a diseased bush. We tried to mimic this strategy by either pruning a diseased cane (at the graft union or at soil line if the bush was on its own root) at first detection of symptoms or at four-to-six weeks after symptom expression. Plants were removed and observed for one year. When pruning was done at first detection of symptoms, 68 percent of bushes were free of virus symptoms one year later. However, if pruning was delayed for four-to-six weeks, 72 percent of the bushes were symptomatic for rose rosette in the first year. We do not know if the virus was eliminated from the bushes with early pruning or if we simply were delaying new symptoms for a significant amount of time. We do not recommend pruning as an effective method for eliminating rose rosette disease in a garden because



pruning at detection of initial symptoms failed in a little more than 30 percent of the experimental plants.

The use of miticides to reduce vector populations and, thereby, reduce the incidence of rose rosette disease has been proposed by many people without data to back their suggestions. In controlled experiments, seven miticide treatments were evaluated for four years to determine their effectiveness in preventing rose rosette disease development in shrub roses. Four miticides with the active ingredients of bifenthrin, fenpyroximate, spiromesifen, or spirotetramat prevented roses from becoming symptomatic for rose rosette disease, whereas 88 percent of the control plants developed symptoms of rose rosette disease in one year. By the end of year two of the experiment, 100 percent of control plants were symptomatic for the disease. Miticides were used weekly from mid-May to mid-September each year at the highest recommended rate. We do not know if miticides can be used less often or at lower rates. Experiments are underway to answer these types of questions.

Over the years, many rosarians have reported a number of rose cultivars that they had observed to become symptomatic for rose rosette disease while other roses nearby remained symptom free. Unfortunately, these types of observations, though valuable, do not inform us if the plants are actually resistant to the disease (or mite) or if they are escapes (susceptible plants that do not become infected due to their location or due to random chance). In conjunction with Texas A&M University, the University of Delaware and private rose breeders, we are evaluating hundreds of rose cultivars, *Rosa* species and rose seedlings in a replicated experiment at multiple locations for resistance to rose rosette disease. Thirteen *Rosa* species are also being evaluated for resistance to *P. fructiphilus* in Tennessee. This is a multiyear project and results will be reported in future years.

Rose rosette disease will continue to be a threat to roses for years to come. However, there is light at the end of the "rose rosette tunnel." The USDA National Institute of Food and Agriculture's Specialty Crop Research Initiative (SCRI) fully funded a grant proposal concerning rose rosette disease in September, 2014, for three years with two additional years funding possible based on grant performance and availability of funding for the additional years. The grant is housed at Texas A&M University and is administrated by Dr. Dave Byrne. Eighteen scientists — including the authors of this report — from public universities, federal labs and private rose companies are part of this effort. Projects are underway to develop quick and inexpensive methods for detection of the virus in rose plants, understanding how the virus infects plants and how plants resist the virus, identification of rose resistant germplasm and how resistance is inherited, eriophyid mite ecology, and development of best management practices for rosarians, landscapers and rose producers.

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