New Test Confirms Rose Rosette Disease

By Will Rowlands

When we heard that Rose Rosette Disease (RRD) had been confirmed in Connecticut by a newly developed molecular test, we decided it was something our readers should know about. After all, most people have a rose or two on their property.

I figured it would be a straightforward research project but I was wrong. Even though the disease has been known for 75 years, we really don’t know all that much about it. And, to complicate matters, the experts don’t always agree on some points.

The Basics

RRD, also known as witches’-broom of rose, is caused by a recently identified virus. There’s general agreement that the virus is spread by microscopic eriophyid mites (*Phyllocoptes fructiphilus*).

Although they only have four legs, eriophyid mites are actually Arachnids or, to be more specific, they’re members of the Acari or Acarina taxon.

Gardeners probably know them best as gall mites or rust mites. There are hundreds of species and many that haven’t even been described yet. Not surprising when you consider they’re not visible to the naked eye.

The virus and the mites are both assumed to be native to North America but the proliferation of *Rosa multiflora* is usually credited with having facilitated their spread across North America.

Multiflora rose is highly susceptible to the disease/mite and, therefore, serves as a reservoir of both the inoculum and the vector.

The disease is often said to affect all species and cultivars in the genus *Rosa*, including cultivated varieties. Susceptibility may vary, however, and some experts believe roses with an Asian heritage may be more susceptible. *R. multiflora* is native to Japan, Korea and Eastern China.

There have been some anecdotal reports of wild roses with resistance but more work needs to be done. Completing the sequencing of the genome of the virus should help in this regard.

Knock Out® Roses and Drift® Roses, for example, are susceptible but [www.starrosesandplants.com](http://www.starrosesandplants.com) reports that quick removal of infected plants (rogueing) is sufficient to stop the disease.

Diseased stem on left exhibiting an enlarged thorny stem. Normal stem and flower on right for comparison.

Discoloration caused by RRD.

Photo / James W Amrine Jr, University of Kentucky, Bugwood.org

Photo / Mary Ann Hansen, Virginia Polytechnic Institute & State Univ., Bugwood.org

Flower Carpet® Roses are susceptible to RRD.

“In discussions with Reinhard Noack, the Flower Carpet breeder relative to the disease,” said Judie Evrard Brower of Tesselaar USA, “he believes the reason we are seeing a lesser incidence of RRD on Flower Carpet is that a lot of the breeding stock for Flower Carpet is *Wichurana* ...”

David Austin Roses USA told us “... as far as we know all rose varieties from whatever group are equally susceptible to RRD.”

Clearly there’s a difference of opinion. Part of problem is that we’re not always on the same page.

Some native roses reportedly have some resistance to the virus but not the mite. If this is the case, they may harbor the mites that vector the disease but won’t die or exhibit symptoms.

Most ornamental roses, on the other hand, appear susceptible to the virus to some degree.

The home gardener needs more information on the susceptibility of popular roses to the mite and the virus.

Infected plants typically die in 1 to 5 years, depending on the plant’s health and size. There is no cure once the virus takes hold and become systemic. Unfortunately, RRD also makes the plant more susceptible to other diseases.

It’s worth noting that some plants may become stunted or symptomatic in some way but won’t die in a timely manner. They may hang on and remain capable of infecting other plants.

Research

It’s a serious enough problem that the USDA announced a $4.6 million five-year grant to combat RRD. The funds will reportedly be matched by in-kind and cash contributions from industry breeders and growers.

Lookalikes

Some of the symptoms of RRD resemble herbicide damage so confirmation by PCR (polymerase chain reaction) testing of the DNA or identification of the mites under a microscope is sometimes necessary, although the disease can often be diagnosed symptomatically.

Background

Symptoms consistent with RRD have been described as far back as the early 1940s in Northern California, Wyoming and Manitoba. The popular wisdom is that the disease and mites are native.
to North America but its proliferation was facilitated by the widespread use of multiflora rose.

*R. multiflora* was imported from Japan for rootstock and other uses as early as the 1700s but went “viral” in the mid-1900s.

Over the years, multiflora rose has been used as wildlife habitat, food for songbirds, for erosion control and reclamation projects, as a living fence and even as a crash barrier and headlight glare blocker on highways.

Unfortunately, the plant is a prolific seed producer that can also spread by layering (canes touching the ground put down roots and develop into new plants) and is considered invasive in many states, including Connecticut. Birds and other animals assist by eating the hips and distributing the seeds.

Interestingly, having multiflora rootstock does not appear to increase a plant’s susceptibility to RRD which may have more to do with the angle of the cane/petiole junction. The overwintering female mites appear to prefer a tight angle.

Multiflora roses are so susceptible to the disease that it has been suggested that the mites can be used as a biocontrol. Rose aficionados, however, are not sold on this approach.

Donna Ellis, chairman of the Connecticut Invasive Plant Working Group put it this way, “A goal of biological control is to find the most specific bioagents with the least non-target impacts.”

Ultimately, over the course of decades, RRD may take care of *Rosa multiflora* on its own.

**RRD in Connecticut**

In 2009, Marci Martin, then the rosarian at Elizabeth Park in West Hartford, brought samples to The Connecticut Agricultural Experiment Station (CAES) in New Haven. Under a dissecting microscope, Rich Cowles and Jim LaMondia found the tiny eriophyid mites that spread the disease deep within a growing tip.

The mites are three or four times smaller than spider mites and cannot be seen without magnification.

The Experiment Station has been diagnosing the disease symptomatically ever since. According to Sharon Douglas, head of the Dept. of Plant Pathology & Ecology, they’ve been using phrases such as “consistent with symptoms associated with RRD.”

“In 2011, the causal organism was determined to be a virus – a member of a new group of viruses called Emaravirus,” said Douglas. “There is still some controversy about this, and whether it might be more than one virus.”

Knowing the causal organism allowed researchers to develop a molecular test for the virus. Connecticut samples were sent to a National Plant Diagnostic Network lab at Oklahoma State University and the disease was confirmed in October 2014.

CAES is getting ready to do the testing. They’re just waiting for the testing protocol to be finalized.

**Disease Transmission**

The disease is transmitted by the mites or by grafting. The mites acquire the virus by feeding on infected plants.

Good hygiene is recommended. While sap does not appear to transmit the virus, the mites can be transported on dirty tools, although it doesn’t appear they live very long without a host.

“The tiny mites carry the Rose Rosette Virus in their mouthparts and impart it into the vascular system of the plant while feeding,” says Martin, a Master Rosarian and former president of the Connecticut Rose Society.

**Mite Movement**

The mites are wingless but can crawl from plant to plant. They’re so small and light they can be carried long distances on wind currents, sometimes called ballooning. For this reason, it has been suggested that taller roses may be more susceptible.

Unfortunately, the mites can also be transported on clothing, tools and possibly by phoresy (attaching themselves to larger critters).

**Prevention**

Scout your location and, if possible, remove all multiflora rose within 100 meters. This may take some vigilance as it’s a prolific seed producer and

*continued on page 22*
the seeds can remain viable in the soil for 10-20 years. If you can't remove it, at least try to avoid planting your roses downwind from them.

Avoid overlapping leaves and canes. Proper spacing between plants makes it more difficult for the mites to crawl from plant to plant. The mites hang out on the undersides of leaves and in growing tips. Females overwinter in the canes and move to new shoots in the spring to lay their eggs.

You can also try alternating different rose varieties or even alternating roses with other plants to make it more difficult for the disease to spread.

Give your ornamental roses a good prune in late winter before new growth appears. Focus on the upper regions where the mites are more likely to be overwintering. Some people recommend a 2/3 prune. Other experts say the disease will just migrate downward so this technique is not a sure thing.

Since some roses have been reported to have some resistance to the mites and/or the virus, it may be possible to breed resistant varieties in the future.

**Early Detection**

Early detection and professional opinions are critical. If you catch it early, when only a cane or two is infected, you may be able to save the plant.

However, many experts recommend removing symptomatic plants immediately. Some even recommended removing adjacent plants just to be sure.

Remember, since the disease can remain dormant or latent for some time, plants may be asymptomatic (the disease is present but there are no symptoms).

**Symptoms**

“The first symptoms the gardener will see are hyper-prickles, strange colored new growth, foliage changes, and distorted buds,” says Martin. Look for:

- Witches’-brooms
- Unusual coloration ... often reddish but sometimes mosaic
- Deformed leaves and flowers
- Small leaves with short petioles
- Lateral buds produce unusual looking shoots
- Abnormal flower color
- Lack of winter hardiness
- Spiral cane growth
- Cultivated roses may exhibit thick, succulent stems and excessive thorniness. (Some varieties have a lot of prickles naturally.)
- Symptoms on cultivated roses are typically less severe

The symptoms of the disease can vary with species, cultivar and age of the plant and may be due to other causes.

Glyphosate damage, for example, causes some of the symptoms associated with RRD. It appears to cause similar deformities but not the vigorous growth and thorniness. 2,4-D damage can include leaf and flower distortions.

Damage due to chemical application is likely to be generalized whereas RRD is more likely to start in one location and spread outward.

**What To Do?**

Joan Allen, a diagnostician and assistant extension educator at UConn, suggests that people might want to get their plants tested before they destroy their prized roses.

Unfortunately, by the time symptoms become obvious, the disease may have spread to other plants.

So, what do you do?

On one extreme, you can simply rogue out all of the roses that appear to be infected, and adjacent roses if you’re really going for it. This is the safest approach but you’re going to feel pretty bad if you destroy a lot of roses and discover, later, that it wasn’t really RRD after all.

On the other extreme, you can prune out affected portions of plants and hope that you’ve gotten it early, before it’s become systemic. In this scenario, you’re going to feel bad if the rest of your roses get infected.

“What I do is to cut off the affected growth if it’s only on a cane or two, and wait to see how the new growth from that spot comes back,” said Martin. “If you can catch it at that phase and the rest of the rose looks good, I’ll leave the rose and wait and watch... and hope that the virus has not gone systemic.”

This is a 50-50 proposition. Remember, recently infected canes may not show symptoms for weeks or even months.

It’s basically a numbers game or risk/reward decision. If you have one plant that appears infected and have a ton of ornamental roses, you should probably just remove the plant(s).

When removing plants you need to get everything, including the roots, to be sure. Bag everything in situ, carefully, and remove. Do not compost!

Most experts say the soil itself is not infected but you need to get everything because the mites can overwinter in plant and root fragments.

Do not replant the area with roses unless you get all of the roots and any volunteers that appear.

If you don’t have a lot of roses and really want to save a particular specimen, you can try pruning and monitoring, and hope for the best.

**Mite Control**

There’s no cure for Rose Rosette Virus once a plant is systemic. You can, however, try to control the spread of the disease by controlling the mites that vector it.

Horticultural oil and insecticidal soaps are routinely recommended but require contact with the mites to be effective and it’s difficult to reach mites buried deep in the buds of growing tips, at the bottom of shoots, in leaf axils and beneath leaf scars. The same would be true of non-systemic pesticides and miticides.

As multiple generations of the mites will develop until cold weather arrives, Neem Oil (azadirachtin) would require multiple applications over time.

A number of sources recommend sulphur. While it is generally considered biorational, keep in mind that continued application of sulfur will acidify soil. Also, sulfur should not be applied within a month of using horticultural oil.

Jennifer Olson, an assistant extension specialist in the Plant Disease and Insect Diagnostic Laboratory (PDIDL) at Oklahoma suggest three possible
options for the home gardener:
- Bonide All Seasons Horticultural & Dormant Spray Oil
- PureSpray GREEN – White Horticultural Spray Oil (OMRI listed)
- Ultra-Pure Oil Horticultural Insecticide/Miticide/Fungicide (hort oil)

A number of chemical options exist for growers and commercial applicators but experts do not routinely recommend miticides for the home gardener coping with Rose Rosette Disease. There are a few reasons for this.

Generally available miticides may not be effective on eriophyid mites and may even kill predatory mites that prey on them or even lead to outbreaks of spider mites.

Eriophyid mites tend to be host-specific so products that work on one species of plant may not work on another.

Several generations of mites may appear in a season so multiple applications are necessary.

Finally, some of the products that might work can only be used by a registered applicator.

One approach is to try and control the mites in plants around an infected plant in order to prevent their spread. This would require pulling or spraying every two weeks from discovery until September.

Also, keep in mind that mites can develop resistance quickly. If you decide to go the chemical route, you should use a rotation of three or more products that are proven to be effective on eriophyid mites and are also “soft” on other life forms.


Be Careful Out There

As always, study up before you start killing things. It can get complicated and might even backfire on you.

In short, the use of miticides without addressing cultural issues isn’t a good idea.

Our Recommendation

The best approach, it seems to us ...
- Get your roses from trusted sources and inquire about susceptibility
- If possible, check the plants at the nursery for signs of infection.
- Remove *R. multiflora* within 100 meters
- Space your plants out and avoid overlapping canes and leaves.
- Give your plants a good winter prune and follow with a treatment of dormant oil
  - Practice good hygiene
  - Monitor closely
  - And, if you must spray, use “soft” OMRI-listed products such as light horticultural oils, neem oil, insecticidal soaps and sulfur that are less likely to cause collateral damage.

The Queen’s Garden

I recently watched “The Queen’s Garden” on PBS and was fascinated to learn that one of their major control methods for leaf-eating pests is garlic-infused water. Some organic gardeners add onion or peppers to the mix. I was disappointed they didn’t do a segment on the rose garden.

Testing

If the symptoms are obvious you may not even need to test because RRD has been diagnosed symptomatically for years.

If you think your roses have RRD, contact CAES’ Plant Disease Information Office. Go to www.ct.gov/caes and click on the appropriate link.

You can also send samples to UConn. Email ladybug@uconn.edu for more information.

Wrap samples in newspaper or dry paper towels, seal in a plastic bag and store in your refrigerator until delivery.

More Information

CAES is working on a fact sheet. Until it’s available, Virginia Cooperative Extension and Oklahoma State University have excellent fact sheets at http://pubs.ext.vt.edu and http://pods.dasnr.okstate.edu

Finally, if all this isn’t geeky enough for you, check out Ann Peck’s online book at www.rosegeek.com

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