Everything we know about Rose Rosette Disease



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Multiflora rose (Rosa multiflora)



Multiflora rose (Rosa multiflora)

- Introduced in 1700-1800s
 - Gardens and rootstock
- 1950s-1960s, US Soil Conservation Service recommended multiflora rose for planting.
 - soil erosion control
 - wildlife conservation
 - living fence

Multiflora rose



Photo credit: James H. Miller, USDA Forest Service, Bugwood.org

Living fence of Multiflora rose



Photo courtesy of James Amrine

Multiflora rose seeds

Multiflora rose hips (seeds inside)



Photo credit: James H. Miller, USDA Forest Service, Bugwood.org

- One large multiflora rose (MFR) may produce 500,000 seeds per year
- Rapid spread
- Considered an invasive plant or noxious weed in some states
 - Iowa, Ohio, West Virginia and New Jersey

The relationship between Multiflora rose and rose rosette disease

- Multiflora rose is present in much of the central and eastern US
- Multiflora rose is highly susceptible to rose rosette disease

• Where we find multiflora rose, we also find rose rosette

RRD Distribution

Survey for RRD in 2002.

Red color indicates that symptoms were present in the county.



Rose Rosette Disease (RRD) Distribution

- RRD was first observed 1940s (called Witches' Broom of rose)
- First reported in Midwest in Nebraska in 1968

RRD first reported in 1941 in Canada, Wyoming and California.



Photo courtesy James Amrine

RRD Distribution

Survey for RRD in 2002.

Red color indicates that symptoms were present in the county.



RRD Distribution

 Both multiflora rose and rose rosette disease can be found in most eastern and midwestern states. It is most common north of I-20.



What is rose rosette?

- Rose rosette disease is
 - A plant virus
 - Researchers in Arkansas recently (published 2011) identified the elusive cause of RRD

Short Communication	A discovery 70 years in the making: characterization of the Rose rosette virus
	Alma G. Laney, ¹ Karen E. Keller, ² Robert R. Martin ^{2,3} and Ioannis E. Tzanetakis ¹
Correspondence Ioannis E. Tzanetakis itzaneta@uark.edu	¹ Department of Plant Pathology, Division of Agriculture, University of Arkansas, Fayetteville, AR 72701, USA
	² USDA-ARS Horticultural Crops Research Laboratory, Corvallis, OR 97330, USA
	³ Department of Botany and Plant Pathology, Oregon State University, OR 97331, USA
	Rose rosette was first described in the early 1940s and it has emerged as one of the most devastating diseases of roses. Although it has been 70 years since the disease description, the rosette agent is yet to be characterized. In this communication, we identify and characterize the putative causal agent of the disease, a negative-sense RNA virus and new member of the genus <i>Emaravirus</i> . The virus was detected in 84/84 rose rosette-affected plants collected from the eastern half of the USA, but not in any of 30 symptomless plants tested. The strong correlation between virus and disease is a good indication that the virus, provisionally named Rose rosette virus, is the causal agent of the disease. Diversity studies using two virus proteins, p3 and p4,
Received 2 February 2011	demonstrated that the virus has low diversity between isolates as they share nucleotide identities

DOI 10.1099/vir.0.031146-0

Accepted 29 March 2011 ranging from 97 to 99%.

Journal of General Virology (2011), 92, 1727-1732

What is rose rosette?

- Rose rosette disease is
 - It is specific to *Rosa spp.*
 - At this point, all cultivated roses are susceptible
 - There are a few native roses that appear to have resistance (very little information about this)
 - For the first time, a diagnostic test for RRV is available

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RRD Spread

- How does rose rosette disease spread?
- Rose rosette is not transmitted mechanically
- Rose rosette is not transmitted in sap

- It is transmitted by
 - Grafting
 - Plant Propagation
 - Mite transmission (most effective method)

The rose flower and bud mite (eriophyid mite)

 The microscopic, eriophyid mite *Phyllocoptes fructiphilus* can transmit rose rosette (first shown in 1968)





Phyllocoptes fructiphilus

Photocredits: Above-Oklahoma State University; right-USDA, ARS.

Rise of RRD

- The Plant Disease and Insect Diagnostic Laboratory (PDIDL) examines 2500-3000 samples per year
- Since 2010, we have received more samples with RRD



Landscape rose in Tulsa, OK with symptoms of RRD

Rise of RRD

- In recent years, 'disease resistant' roses have been introduced to the market
- Although these roses are resistant to a number of pathogens, they are not resistant to RRD
- Most homeowners have at least one rose



Recognizing Rose Rosette Disease

• Subtle or early symptoms

• More obvious symptoms

RRD symptom: red color to foliage



<u>RRD symptom: red color to foliage</u>

- Glowing peace rose
- Many roses have red color to new growth
- Is this normal? How do I tell?



New Growth or RRD?

Memorial Day rose



New Growth or RRD?

• Memorial Day



NORMAL



Lady Elsie May

ABNORMAL - this rose has RRD

New Growth or RRD?

• Queen Elizabeth

• NORMAL



<u>RRD symptom</u>: Excessive thorns (prickles)



Looks normal



Electron rose

Lots of prickles-normal for this variety



Electron rose

<u>RRD symptom</u>: Excessive prickles (thorns)



<u>RRD symptom</u>: Excessive prickles (thorns)

Oklahoma



<u>RRD symptom:</u> Elongated shoots



 This symptom will occur with other symptoms such as excessive prickles, red color, etc.

<u>RRD symptom:</u> Elongated shoots (or growth only at tip of cane)



Usually elongated shoots occur with a rosette or witches' broom



Definition: Witches' broom

 Several branches or stems arise from at or nearly the same point. Usually occurs with shortened internodes.



<u>RRD symptom</u>: Rosette or Witches' Broom



<u>RRD symptom</u>: Rosette or Witches' Broom



<u>RRD symptom:</u>

Leaf distortion and discoloration



RRD symptom:

Leaf distortion and discoloration



<u>RRD symptom</u>: Leaf distortion and discoloration



<u>RRD symptom</u>: Leaf distortion and discoloration



<u>RRD symptom</u>: Flowers are distorted, reduced or blighted



<u>RRD symptom</u>: Flowers are distorted, reduced or blighted

 Cherry Parfait



<u>RRD symptom</u>: Flowers are distorted, reduced or blighted



<u>RRD Symptom</u>: Dieback (rule out fungal cankers)



RRD symptom: Dieback



<u>RRD symptom</u>: pliable or fragile stems



<u>RRD symptom</u>: Stunting and reduced vigor



<u>RRD symptom</u>: Stunting and reduced vigor

Carefree
Spirit



RRD symptom: Overall Decline



What to do when RRD is suspected?

- If there are obvious RRD symptoms, there is no need to submit a sample
- If a testing is needed, collect symptomatic shoots
- Wrap in newspaper or a few dry paper towels
- Immediately put in a sealed plastic bag
- Store in the refrigerator until it is delivered to the local county extension office



What to do when RRD is suspected?

- A specialist will examine the sample for the microscopic rose mites
- Be sure to collect several shoots (even if some are healthy). We are less likely to find mites on small samples.

The rose mite, *Phyllocoptes fructiphilus* at the base of a rose bud. Investigate the use of chemicals in the area

- Especially herbicides
 - Lawns
 - Driveways
 - Spot sprays
 - Sprays made by your neighbor (or your spouse)

Herbicide damage (in this case glyphosate) looks similar to RRD



Investigate the use of chemicals in the area

• Herbicide applications may have been made the previous season or during dormancy

• When in doubt, send a sample for laboratory testing

Herbicide damage (in this case glyphosate) looks similar to RRD



Questions?

• About rose rosette virus or symptoms?

 (more info about the mite and management will be delivered in the next presentations)