

# THE MANY FACES OF ROSE ROSETTE DISEASE

A VIRUS OF DISGUISES

Presented by  
Gaye Hammond, Past President  
Houston Rose Society  
[gayeh@LPM-triallaw.com](mailto:gayeh@LPM-triallaw.com)



# VIRUS ARE SPECIAL

Rose mosaic virus



Most viruses show up in spring when temps are relatively cool; or summer when plants are stressed

- ▶ Very small and simple disease-causing agents
- ▶ Multiply in the cells they invade and travel through plant at a cellular level
- ▶ Difficult to attack chemically without doing equal damage to the host cell
- ▶ Overcomes plant's antiviral defenses
- ▶ Prevention rather than cure is key
- ▶ Spread by propagation (infected when you bought it), insects, seed, root grafts

# Rose Rosette Disease (RRD)

- ▶ “THE MAJOR PLANT DISEASE OF ROSES IN THE WORLD”
- ▶ Caused by the Rose Rosette Virus (RRV)
- ▶ Does not show up with symptoms of variegated foliage like other virus
- ▶ Different, deadly & contagious
- ▶ Only affects roses

NCPN June 2022



Witches broom in hedge of roses at Omaha hotel



# ROSE ROSETTE DISEASE



Chislaine de Feligonde infected  
with RRD

- ▶ RRV can only replicate inside living cells – if bush is dead disease is likely dead also
- ▶ Disease transmissions occurs more often in summer
- ▶ Warmer parts of the US can see transmission year round
- ▶ Consider virus is systemic – infecting the entire plant
- ▶ When symptoms occur depends on the cultivar, age, size and general health of the plant

# RRD is Not New – Our Understanding Is



RRV infected every bush in this hedge of roses at post office  
in Chattanooga, TN



# RRD - 1940 to Now

Witches' Broom (?virus) was observed affecting some canes at Morden, Man.; the number of spines was greatly increased on affected canes.

I.L. Conners, Associate Pathologist (1940)  
12<sup>th</sup> Annual Report of the Canadian Plant Disease Survey

While RRD was first described in the 1940's, only in the last 10 – 15 years has the virus become a problem in commercial, public, residential rose plantings and commercial production facilities.



Personal conversation  
with Jeekin Lau, June 2022

Lau, et al, July 2022  
Frontiers in Science

Tulsa Rose Garden

# NEW NAME – SAME VIRUS



International Committee  
of Taxonomy of Viruses

- ▶ RRV is an “Emaravirus”
- ▶ RRV is 1 of 9 Emaravirus in the US
- ▶ Emaraviruses attack specific plant groups
- ▶ Name change brings RRV into same naming protocol as other Emaravirus

“Emaravirus Rosacea”

# Then / Now –What's Different?

Up until 1990's



Cuttings taken by hand.  
Diseased plants identified  
before contamination.

Now



Cuttings taken by machine. If RRD  
infected tissue harvested – no way to  
know where the sick plant is.



# What Else is Different?



TX rose industry stepped up, burned the fields – RRD gone until 2011



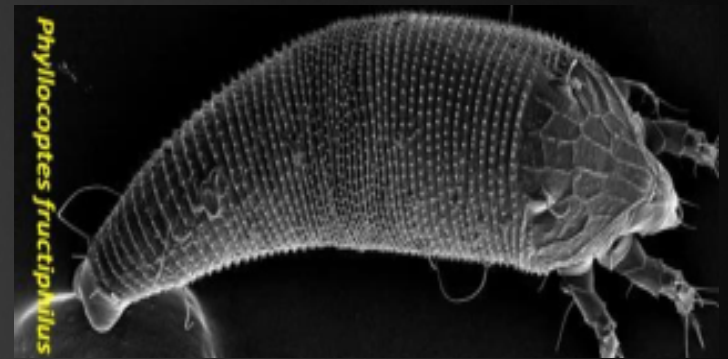
Select destruction of plants testing positive. Remainder left in the fields.

Weeks Roses Production Field  
Wasco, Calif

# RRD – How Roses Get It

- Primary reason - transmitted Eriophyid (wingless) mite, *Phyllocoptes fructiphilus* or *Eriophyes eremus*
  - Can only travel about 30-50 yards on air currents
  - Mites dislodged from plant starve to death in 5 days
  - Mites move from plant to plant by:
    - Walking (if plants touch)
    - Blown by wind or **leafblowers**
    - Hitchhiking a ride on insects, birds, humans
- 2<sup>nd</sup> Reason - Plant propagation, budding, grafting and movement of infected plant stock

Other means of transmission discounted



Since the mite is the primary means of infection –  
eliminating the mite makes sense



# RRD in Houston 2014-2022



The Galleria  
2018



Louis Felipe

Tanglewood 2014



Knock Out

Richmond 2017

Vectoring mites found in 40% of samples tested



# RRD in Houston 2014-2022



Copperfield 2021



Sugarland 2021



Katy 2021

Vectoring mites found in 40% of samples tested



# RRD in Houston 2014 - 2022



Memorial City Mall 2018



Cypress 2022



The Woodlands 2020

Vectoring mites found in 40% of samples tested

Populations of *P. fructiphilus* are 40 times or higher on witches broom than on asymptomatic foliage on an infected plant



Pruning off rosettes until the plant can be removed makes sound epidemiological sense



# DELAY Can Be the Enemy

If you wait until  
witches broom  
forms – you've  
lost the plant

Mite populations  
have built until  
they are ballooning  
to other plants

Other plants likely  
infected

Windham 2019



As the number of mites increase by 10, the symptoms of RRD are 1.25 times more likely to be observed...Solo, et al 2020; NCPN June 2022

# Important to Know

- Symptoms can appear 3 weeks to 1 year after inoculation
- Plants in stress more prone to contract virus and more prone to demonstrate
- Disease symptoms accelerate as weather is hotter
- Infected plants usually die within one year after symptoms appear
  - do they die from RRV or from being weakened to the point that they succumb to other pests/disease?
- May not be readily apparent especially in densely foliated shrub roses. Check the plant's interior for abnormal growth



RRD in Belinda's Dream



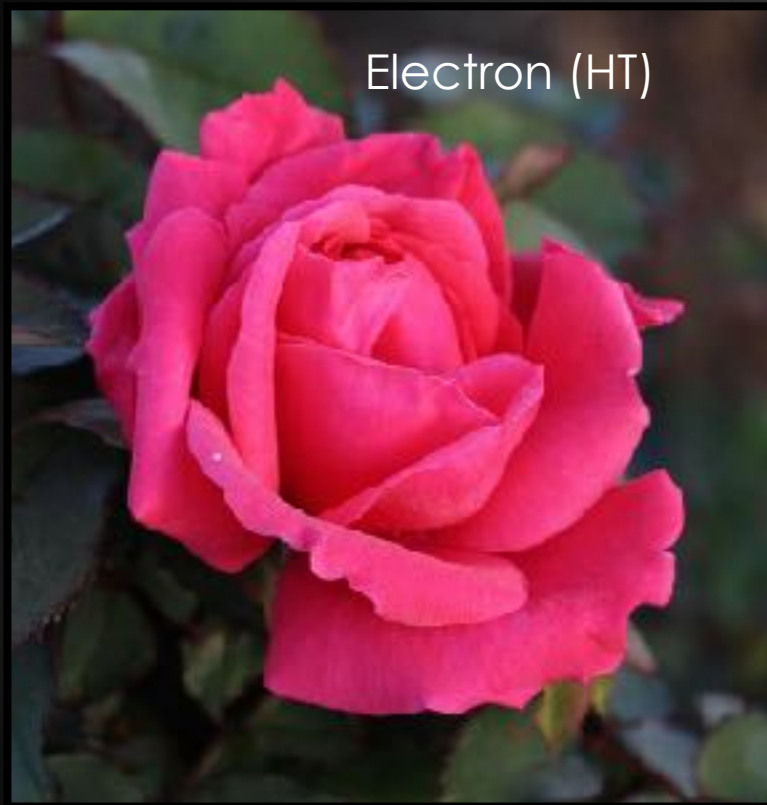
# Important to Know



Excessive overgrown thorns

- ▶ Symptoms can differ between cultivars
- ▶ Important to know what is normal for your rose
- ▶ If 2 or more symptoms are present, the plant is likely infected (Windham 2019)
- ▶ Most common symptoms
  - ▶ Witches broom
  - ▶ Strapped leaves
  - ▶ Flattened stems
  - ▶ Increased thorniness
  - ▶ Rubbery stems/thorns

# Know What's Normal in Your Rose



Electron (HT)

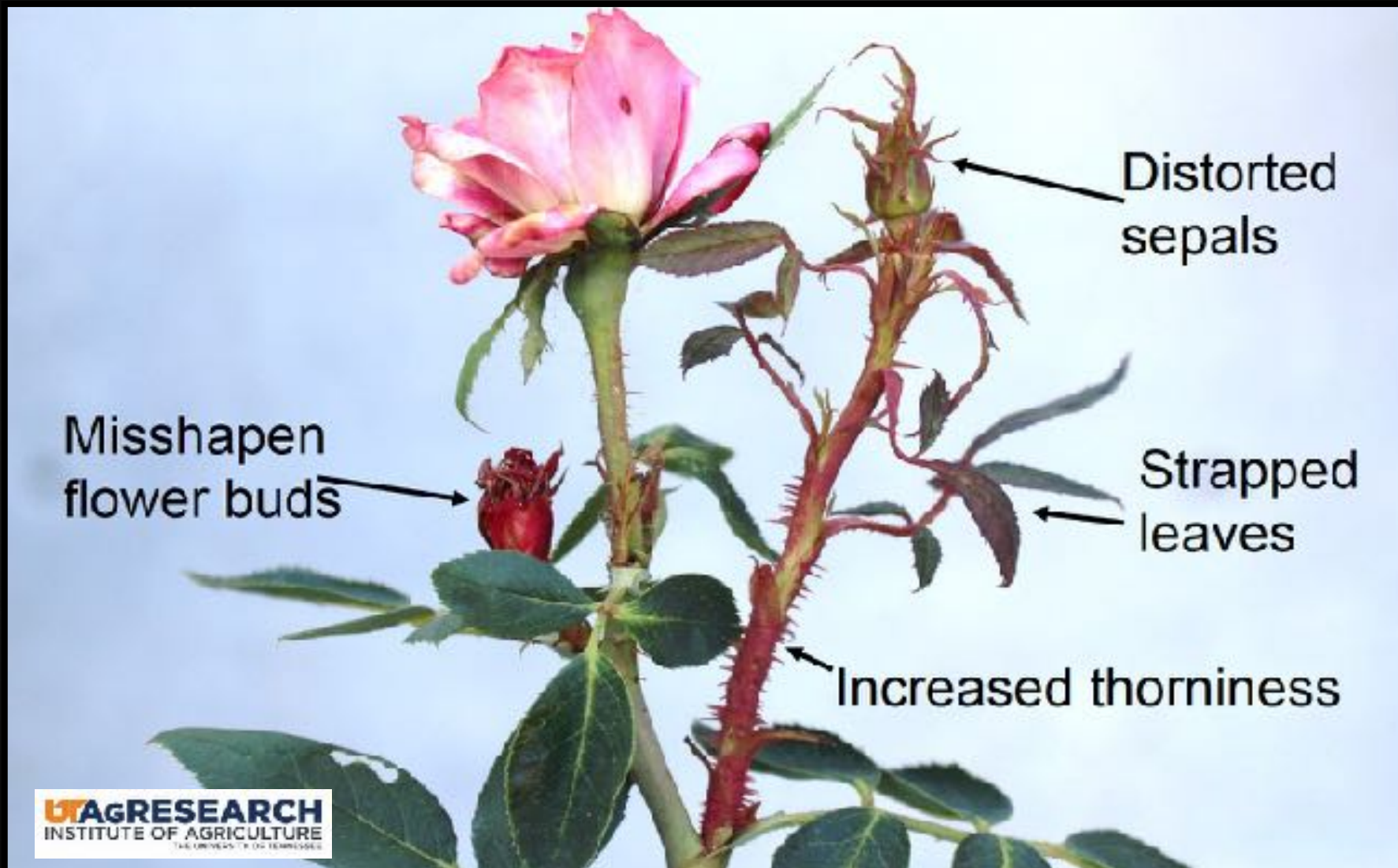
Thorn pattern normal  
for this rose



Homeowner thought bush had  
RRD because of thorniness



# Detection: Compare Normal to Abnormal on Same Bush



# What to Do?

- ▶ Currently there is no cure
- ▶ Prevention by using clean planting stock and destroying infected plants are most important steps for control
- ▶ Early detection and removal of infected plants is the best way to reduce the spread and impact of the virus
- ▶ Make sure it is RRD before you act!



Study biological control agents and match them to when the population of mites is the highest

The success of control could be increased if the control(s) reduce the number of mites to a low density because few would transmit RRV through feeding



# Miticides Successfully Used to Stop RRV in the Field Studies

- Akari, Forbid, Kontos and Talstar have prevented RRV in research plots for 5 years (control plants fail in 2 yrs or less) – check label before use
- Work is underway to determine proper spray intervals, when to start and stop spraying and if spray intervals are the same for the all miticides

A systemic miticide has a better chance of reaching the niche areas of the plants where mites located



Commercial



Bifen I/T



Compare-N-Save  
Bifenthrin is the  
Active ingredient

Home Use

# Antiviral Compounds / Application



Antiviral efficacy trial (rate, application type & timing)

Using with and without a miticide

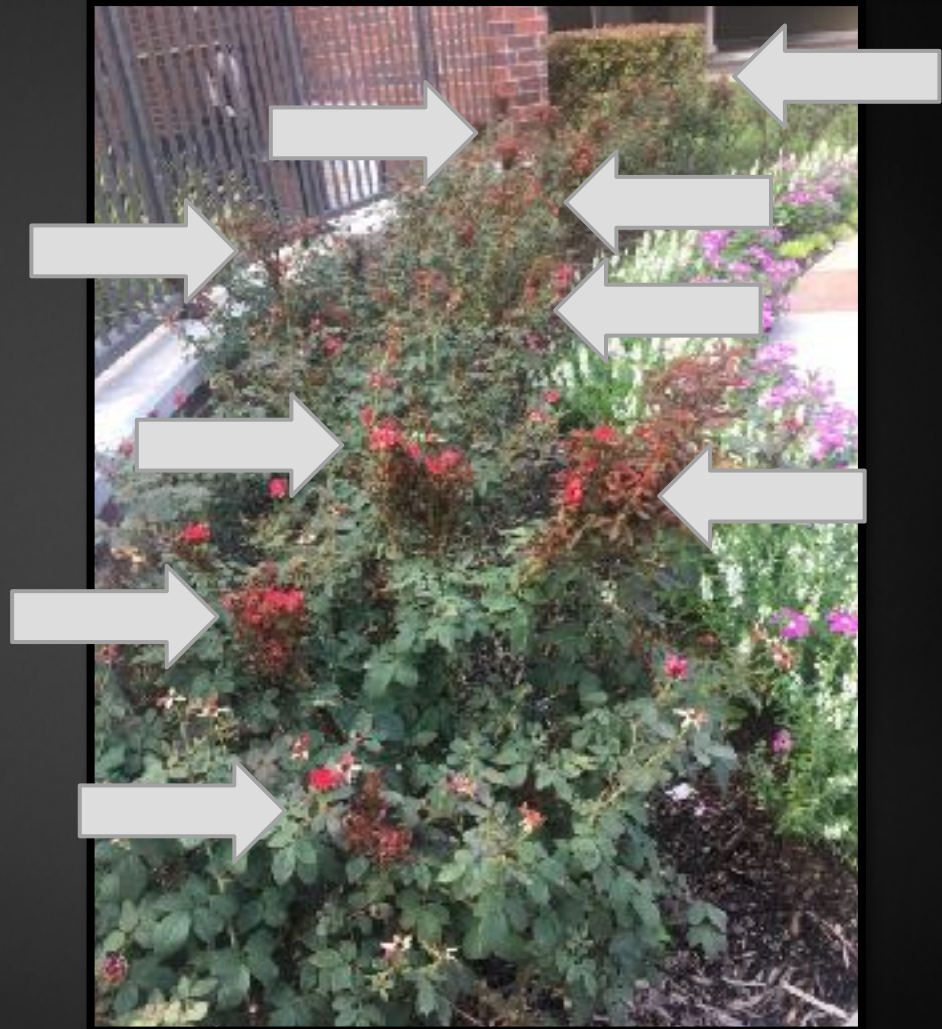
Company suggests that compounds may also induce resistance to fungal diseases and aphids

This trial is in process



# Stop Using Leafblowers!

- ▶ This apartment complex had 1 bush with 1 witches' broom
- ▶ When they learned of RRD they had the lawncare person cut it off
- ▶ He/She blew the witches broom in a pile with a leafblower for easy clean-up
- ▶ In 3 weeks, all 150 bushes on the property had symptoms of RRD
- ▶ Live mites were found on infected specimens



The leafblower was responsible for relocating mites from one sick plant to 150 healthy bushes!!!

# RRD – Looks Like Other Things

- ▶ Symptoms confused with
  - ▶ Chilli thrips
  - ▶ Herbicide Damage
  - ▶ Chlorosis (Yellowing)
  - ▶ Spider Mite Damage
  - ▶ Normal New Growth
  - ▶ Over Fertilization



In a 3 week period in 2019 – there were 11 cases of RRD misdiagnosis In Houston

**Be Smart!**



# RRD or Chilli Thrips



Chilli Thrips Damage - note  
dark lesions in leaf tissue



Leaf distortion caused by RRV

With RRD - leaves typically do not have lesions

# RRD or Herbicide Damage



Tested by OK State Path  
Lab – Herbicide Damage



Herbicide damage – City sprayed curb  
on the other side of the fence



Brush killer applied to right-of-  
way near this cemetery.  
Exposure to vapor caused  
damage.



# RRD or Herbicide Damage



Professional landscaper sprayed  
Round-up along church parking lot



Herbicide sprayed on shoulder of the  
road 200 yds from a collection of roses

# RRD or Spider Mite Damage



Webbing  
is a dead  
give-away  
for spider  
mite damage



# “Strapped” (narrow) Leaves



Narrow  
leaves are  
normal in  
some  
cultivars

Compare size  
& shape of  
normal  
leaves to  
those that  
are abnormal

Strapped leaves with RRV can be red, yellow, bronze, green or a mix

# Rubbery Stems / Thorns Only RRV Causes This



Thorns will bend  
from side to side  
without breaking off



# Distorted Blooms / Buds Lots of Things Can Cause



RRD



Unknown white HT

RRD



RRD



Normal

Belinda's Dream



Celestial Night (courtesy of Heirloom Roses)

# Distorted / Premature Bud Formation w/ RRD





# Chlorosis (yellowing) / Prominent Veining w/ RRD



Leaf chlorosis (yellowing) may not always be present with RRV – can also be caused by nutrient deficiencies and exposure to saline irrigation water. In Houston, it is common to see in summer months in relation to heat/drought stress; can also be seen if plants overwatered

# Thickened Canes - Caused by Many Things

- ▶ Can be caused by over fertilization & weather
- ▶ In this case it was caused by RRV
- ▶ Note size difference between unique growth and other stems in same plant
- ▶ Excessive prickles, straggled leaves plus thickened canes all consistent with RRD





# Witches' Broom



Formation  
of "witches  
broom" growth

This is the most  
common and  
definitive  
symptom of  
Rose Rosette  
Disease

Nothing else  
causes this!

Witches' Broom can look different from rose to rose



# Witches' Broom Has Many Faces



Knock Out



Belinda's Dream



# Witches' Broom



Hidden deep inside  
really large bush



1 visibly symptomatic  
stem in *R. multiflora*



# Witches' Broom



RRV in Old Blush was not red



Witches' Broom in Sweet Drift



# Petrified Witches' Broom

We know the Old Blush at this location had RRD for at least 2 years because the witches broom growth in the interior of the plant was dried in place.

It had gotten so large and heavy that it pulled away from the main stem – disrupting the flow of water/nutrients and dried in place.

Normally, this would have fallen off, become part of the leaf litter and RRD gone unnoticed.



# Excessive Thorniness - Only RRV Causes This



Thorns become needle-like thinner and more closely spaced (Cherry Parfait)



RRV can produce ridiculous numbers of thorns that may stay green



Thorns may be so excessive that stems look more like a nettle than a rose



# Excessive Thorniness



Hundreds of thorns per 1" of stem



Abrupt starting / stopping  
of excessive thorniness  
is something to watch for

# Excessive Thorniness

If a normal stem has thorns spaced 1" apart – a rose stem infected with RRD may have 50 to 100 thorns in the same distance

Compare thorn pattern on suspect cane to normal growth on the same bush



Nothing else is known to cause this in roses  
Just because a rose has a lot of thorns – does not mean it has RRD



# Excessive Thorniness



Normal and excessive thorn pattern on same bush



# This IS NOT Excessive!



Reported as RRD due to 2 thorns in same location – this is not excessive



Red new growth + thorns on new cane caused gardener to think he had RRD



Submitted due to number of prickle stubs



# “Red” does not mean RRD

- ▶ New growth in roses tends to be red, maroon or bronze that changes to green
- ▶ Red = water soluble pigment that determines flower, berry and leaf colors
- ▶ Helps protect young stems and leaves from damage by UV rays
- ▶ As tissue hardens off, red fades and changes to green



Normal new growth in healthy rose

In roses infected with RRD – red may not change to green

# Multiple Things Can Be Going On



This bush tested positive for RRD and the stem that tested positive also has a severe powdery mildew infection

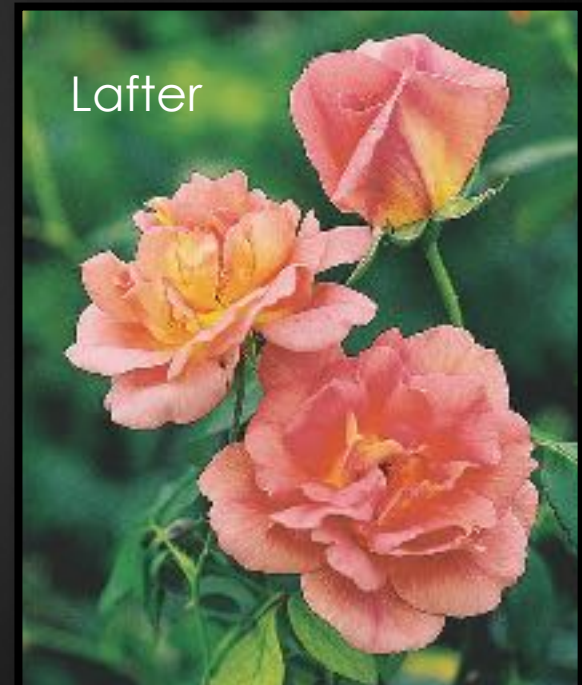


Same bush has nutrient deficiency



# Good News - Resistance to RRD

- ▶ 2 genetic markers for resistance to RRD have been identified
- ▶ Roses indicating resistance to RRD (800 plants) planted at RRD-Resistance Plots in Bixby, OK in April 2022
- ▶ Goal – confirm level of resistance previously identified
- ▶ Search for other sources of resistance (relatives)
- ▶ Expand genetic studies (Morden Blush, Morden Fireglow, Lafter, *R. setigera*)
- ▶ Stack resistance genes for RRD with resistance genes for blackspot, *Cercospora*



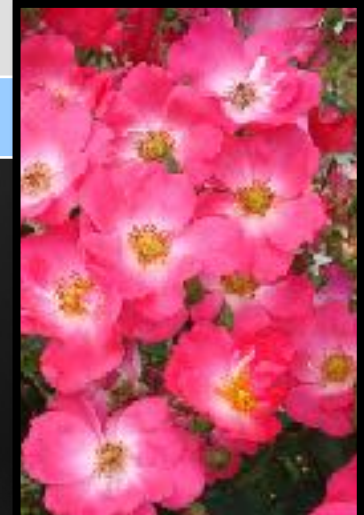
# No Symptoms – No Virus

## 3-Year Trials in TN & Delaware

Species	Rugosa hybrids	Cultivars
R. Arkansana	Fuzzy Wuzzy Red	Chuckles (F)
R. Carolina	Purple Pavement	Fair Molly (Poly)
R. Folialosa		John Davis (H. Kordesii)
R. Virginiana		Morden Blush (S)
R. Woodsii – bracteate		
R. rugosa		

Windham, NCPN June 2022

Chuckles – only modern  
rose to perform  
reasonably well in Houston





# Few to Moderate RRD Symptoms

## 3-Year Trials in TN and Delaware

Abbye de Clyny (HT)	Frau Dagmar Hartopp (HR)	Morden Centennial (S)
Basye's Purple (S)	Intrigue (F)	Morden Fireglow (S)
Brite Eyes (Lg F Cl)	John Cabot (H Kordesii)	Queen Elizabeth (HT)
Caldwell Pink (Poly)	Julia Child (F)	Red Drift (S)
Carefree Wonder (S)	Lafter (HT)	R. Wichuriana poterfolia
Charisma	Little Buckaroo (Mini)	Sorcerer (Mini)
Cherry Parfait (GF)	Love (GF)	Winner's Circle (LGCC)
De La Grifferraie (H multi)	Manetti (H Noisette)	
Electron (HT)	Marmalade Skies (F)	

# Knock Out® is Not to Blame

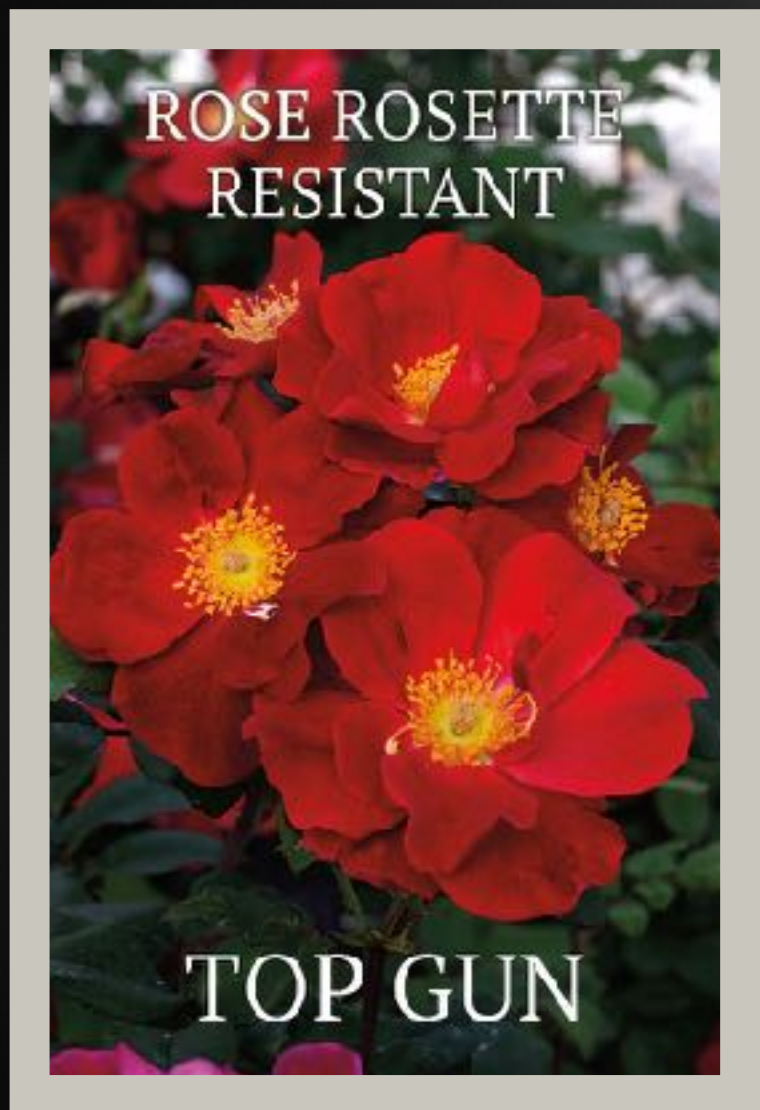


There is no data that supports the premise that Knock Out roses are more susceptible than other cultivars to RRD

- ▶ RRD existed 50 years before Knock Out was created
- ▶ Knock Out is no more susceptible to RRD than another other rose
- ▶ Rosa multiflora is not in the parentage of Knock Out
- ▶ Routinely planted in areas where no one looks at the plant regularly – thus if infected, the plant becomes a reservoir of virus and mites



# BEWARE OF THESE CLAIMS



Decades of research and extensive field testing have gone into creating remarkable varieties, which defy disease and delight consumers. We want you to enjoy growing roses and we also want to do our part in caring for the environment by minimizing the need for toxic sprays.

Top Gun™ resists Rose Rosette disease as well as blackspot, downy mildew, powdery mildew and rust. Its glossy green foliage forms a fortress against disease. New buds fire up in clusters with a rapid repeat. They open up to reveal intriguing deep red blooms, providing a profusion in color. The rounded habit of the plant, makes it ideal for placement in any yard.

If you are looking for carefree self-reliant roses, which are up-to-date with disease protection, you need Top Gun™ roses.

Contact your Salesperson to place an order.

**Top Gun Disease Resistance**  
5 roses=exceptional, 4=very good,  
3=above average, 2=average,  
1=below average\*

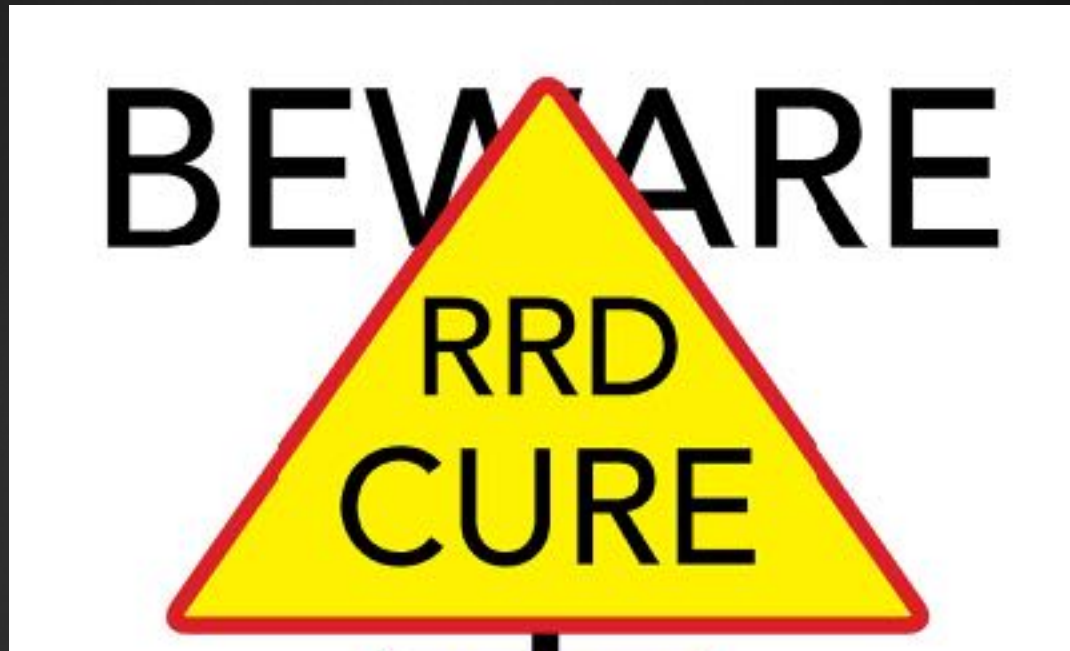
\*Plant keeps some leaves and refoliate after peak humid season

Blackspot	
Powdery Mildew	
Downy Mildew	
Rust	
Rose Rosette	

[Read More](#)

By 2017 Top Gun developed RRD in research plots at Univ of TN and Univ of Delaware

# Be skeptical of “cures”



There is **NO CURE** for rose rosette disease at this time.....  
no matter what you hear from people with products  
to sell



# The Final Word

- ▶ Don't Panic!!!!
  - ▶ Most cases of suspected RRD in Harris County have ended up being something else that could be cured
- ▶ Don't Overreact!
  - ▶ RRD is not the end of the world
- ▶ Stay vigilant. Inspect weekly.
- ▶ Be smart & obtain plants from sources with clean stock
- ▶ Get a second opinion – or a lab test if you think you have it
- ▶ Be ready to take immediate action



Dr. Kevin Ong (TAMU) and Gaye Hammond confirm Houston's first diagnosis of RRD in 2014

# Rose Rosette Resources:

- Gaye Hammond, [gayeh@LPM-triallaw.com](mailto:gayeh@LPM-triallaw.com)
- Rose Rosette Network, [www.RoseRosette.org](http://www.RoseRosette.org)
- Combatting Rose Rosette Facebook, <https://www.facebook.com/CombatingRoseRosette/>



Research on RRV/RRD continues to evolve as funding becomes available for all aspects of research on the disease and its vector. For this reason, older publications may not have the best or most accurate data for management of the virus.



# Concern from Industry



Scientists at University of TN interviewed 566+ industry professionals

- 147 in TN
- 119 in NC
- 300+ in SC

Most say RRD hurt their reputations and cost them clients

Majority of landscape professionals say they are bidding fewer jobs with roses

How do we restore confidence in the use of roses in commercial landscapes?

# RRD – What to do?



Avoid activity that would dislodge the mite



Remove symptomatic plants early.....

Once the virus becomes systemic in the plant nothing sprayed on the plant will cure the disease



# RRD – What to do?

Current recommended method for removal of infected plants:

1. Cover the plant with a large heavy gauge garbage bag (for really large shrubs use a Christmas tree bag)
2. Tightly tie the bag off at the base of the plant
3. Cut or saw through the base of the plant below where the bag is tied. The entire plant with any resident mites should will be inside the bag.
4. Send the bag to the landfill – do not compost RRD-infected plants
5. Dig up the remaining root system and dispose
6. Do not replant at that spot for at least 2 weeks (any mites dislodged need to be starved to death before new plants are installed)
7. Prune off any new growth on adjacent roses
8. Constantly monitor site for reoccurrence

THERE IS NO CURE FOR ROSE ROSETTE DISEASE

**DO NOT USE LEAF BLOWERS AROUND RRD-INFECTED BUSHES**

# RRD - Resources

AmericanHort (association of nursery and landscape professionals) website, [www.roserosettedisease.com](http://www.roserosettedisease.com)

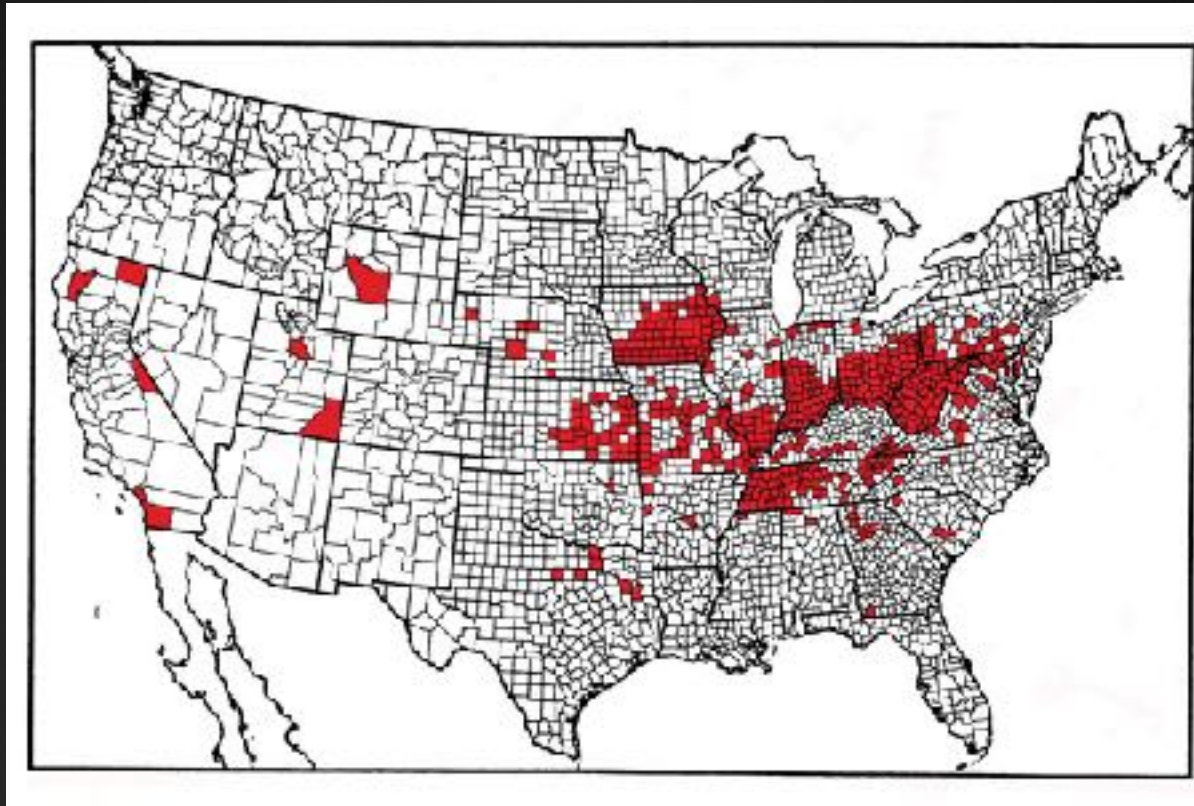
- Numerous publications on rose rosette disease
- Webinars
- Videos

Specimen samples from plants suspected of having RRD can be sent to the Texas Plant Disease Diagnostic Laboratory at Texas A&M University. Directions on how to take and submit samples along with testing fees are available at [www.plantclinic.tamu.edu](http://www.plantclinic.tamu.edu)

**Some RRD symptoms mimic symptoms from other causes –  
Get confirmation of virus before taking action**



# RRD – Where is it?



Distribution of RRD as of 2002  
J. W. Armine, Jr., West Virginia University

RRD currently showing up faster than literature can report

# RRD in Houston

And we almost missed this.....

Sometimes the reddening is not apparent – even though the plant tests positive for RRD

Relying on one symptom to identify RRD is NOT the best approach

RRD





# RRD – What to Do?



Call me!

Take a sample

Get a confirmed  
diagnosis

Before you do  
anything!

# RRD – Research Science Helping You!

011/05  
Rev 05/1

**AgriLIFE EXTENSION**  
Texas A&M System

**Texas Plant Disease Diagnostic Laboratory**  
1900 D. J. Niswonger Parkway, Suite A-34  
Texas A&M University Research Park  
College Station, Texas 77745  
e-mail: plantdiag@agrilife.tamu.edu phone: 979/845-8032 fax: 979/845-6499  
http://plantdiag.tamu.edu

**TPDDE clearly, simply & quickly**

Free AgriLife  
Awards

☐ Photo \_\_\_\_\_

### PLANT DISEASE DIAGNOSIS FORM

Send photos, samples, photos, and samples to the laboratory in advance of appointment. Please call 979/845-8032 for more information. Do not send samples to the laboratory if you are not sure of the plant species.

<b>SUBMITTER CONTACT INFORMATION (PLEASE PRINT)</b>		<b>GROWER CONTACT INFORMATION (please complete if different from submitter)</b>	
Name _____		Name _____	
Company Name (if commercial) _____		Company Name (if commercial) _____	
Address _____		Address _____	
City _____	County _____	State/Zip _____	City _____
Phone _____ Fax _____		Phone _____ Fax _____	
E-mail _____		E-mail _____	
<input type="checkbox"/> Extension Specialist <input type="checkbox"/> Horticulture* <input type="checkbox"/> Entomology <input type="checkbox"/> Plant Pathology <input type="checkbox"/> Weed Science <input type="checkbox"/> Plant Breeding <input type="checkbox"/> Law/Tree Care Co. <input type="checkbox"/> Nursery/Greenhouse/Garden Center <input type="checkbox"/> Dealer/Distributor <input type="checkbox"/> Other		<input type="checkbox"/> Extension Specialist <input type="checkbox"/> Horticulture* <input type="checkbox"/> Entomology <input type="checkbox"/> Plant Pathology <input type="checkbox"/> Weed Science <input type="checkbox"/> Plant Breeding <input type="checkbox"/> Law/Tree Care Co. <input type="checkbox"/> Nursery/Greenhouse/Garden Center <input type="checkbox"/> Dealer/Distributor <input type="checkbox"/> Other	
Send results to: <input type="checkbox"/> Submitter <input type="checkbox"/> Owner <input type="checkbox"/> Extension Specialist		Send results to: <input type="checkbox"/> Grower <input type="checkbox"/> Extension Specialist	

Please complete form for diagnostic services. Please PRINT and check all that apply.

Plant: \_\_\_\_\_ name (scientific): \_\_\_\_\_

Planting date: \_\_\_\_\_ % of plants affected: \_\_\_\_\_ % of area affected on the plant: \_\_\_\_\_

Date first noticed: \_\_\_\_\_ Soil pH: \_\_\_\_\_ Problem developed:  Sudden  Gradually

Have you consulted other aides, what was concluded: \_\_\_\_\_

Have you previously contacted an AgriLife Extension agent about this problem?  Yes  No

Location of plants:  Within 10 feet (3 meters) of building, pool, pavement, or road    Along fence row    Greenhouse  
 Urban or residential    Open pasture    In any other \_\_\_\_\_

Attest path:  Whole plant    Branch/stem    Storage device    Leaves    Fruit    Roots

Symptoms:  Dead plant    Leaf spots    Canker/stalk    Wilting    Dieback    Yellowing  
 Leaf scorch    Other \_\_\_\_\_

Distribution or problem plants:  Single plant    Scattered plants    Large area    Small acreage or area

Watering practices:  Spinkler    Another 3 times/week    Hand water    Daily    None  
 Drip system    From tank or reservoir    Variable or needed

Specific (as request) see check box. Additional fees may apply see <http://plantdiag.tamu.edu> to complete the schedule.  
 Culture  Fungal    BSM    BSM-DNA    Bacterial culture    Virus    Other \_\_\_\_\_

**Recent pesticide & chemical applications**

	Product name	Date
<input type="checkbox"/> Fungicide		
<input type="checkbox"/> Fertilizer		
<input type="checkbox"/> Insecticide		
<input type="checkbox"/> Herbicide		
<input type="checkbox"/> Other		

**As of June 1, 2011 Routine diagnostic charge is \$5 per specimen. All out-of-state samples will be assessed a 20 surcharge/sample. For complete fee schedule, visit: <http://plantdiag.tamu.edu>**

Please make checks payable to **Texas AgriLife Extension Services**. Send bill to:  Submitter    Grower    AgriLife Extension Services

Check to determine additional services beyond routine diagnostic procedures. **AgriLife will pay a minimum of 25% for the service. Payment has greater benefit on services informed.**

Please email photos to [plantdiag@agrilife.tamu.edu](mailto:plantdiag@agrilife.tamu.edu)

Signature: \_\_\_\_\_  
 Printed name: \_\_\_\_\_

Submitter contact: \_\_\_\_\_  
 Please City/County/zip code: \_\_\_\_\_

©2005 AgriLife Extension. All rights reserved. This form is a registered trademark of Texas A&M University. AgriLife Extension is a registered trademark of Texas A&M University. The Texas A&M System, the Texas A&M University Research Park, the Texas A&M University System, and the Texas A&M University System are trademarks of Texas A&M University.



# RRD – What to do?



Don't just dig it up!!!

This is the **WRONG** way to remove a bush with a confirmed case of RRD

# RRD – an Emaravirus

- **Rose Rosette Disease is caused by an Emaravirus ...Rose Rosette Virus**
- **First noted in the US in 1941. First noted in TX in 1990**
- **Only affects roses – only in the U.S.**
- **Infection is lethal to plant & contagious**
- **Once infected, virus spreads through plant at the cellular level**
- **Overcomes plants' antiviral defense system**
- **Has killed hundreds of thousands of plants**

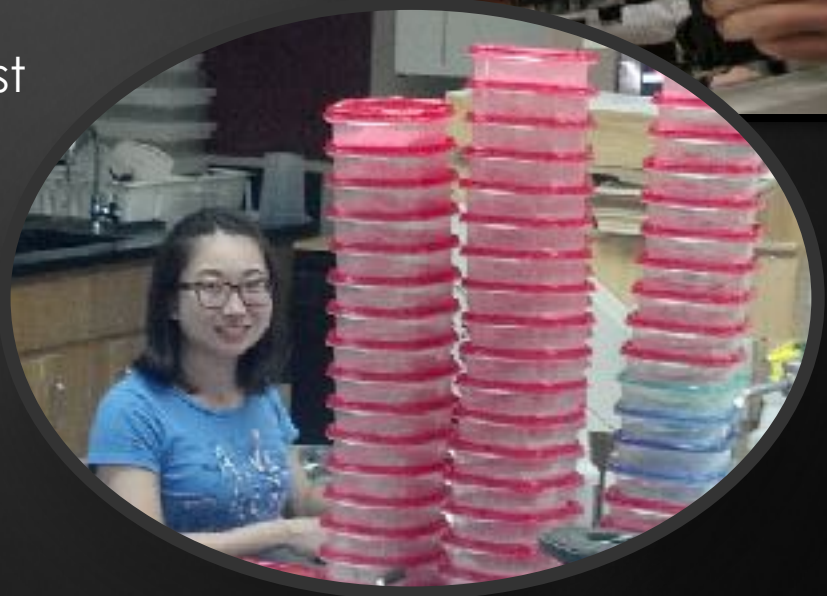
**Showed up in Texas in +/- 2011 at epidemic levels – prior to that last outbreak was 1990**



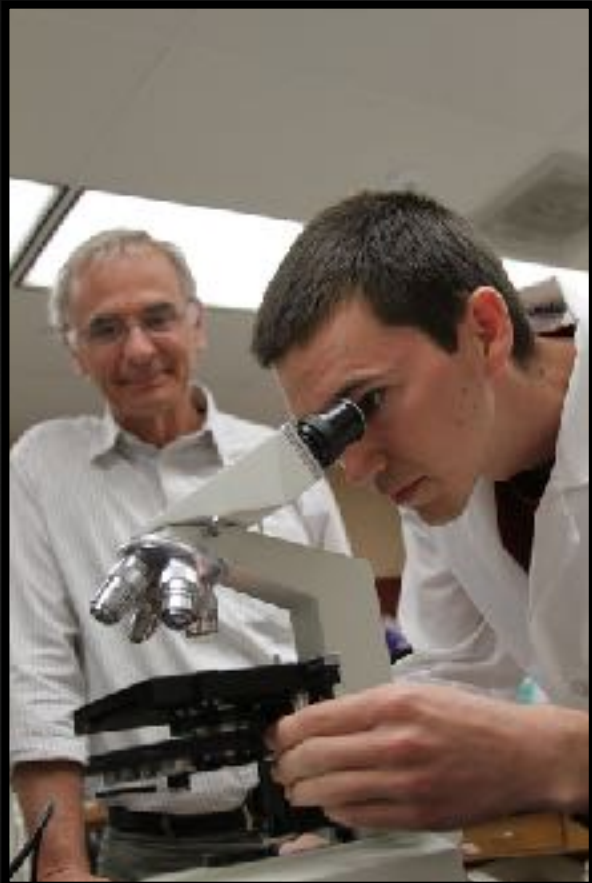


# Laboratory Testing

- ▶ Multiple types of diagnostic testing
- ▶ Some work better than others
- ▶ PCR amplification most reliable but takes a long time
- ▶ Virus hard to see under microscopy
- ▶ Symptomatic plants can test negative and later positive
- ▶ Need reliability, need test that can be done quickly and in the field



# RRD – Research Science Helping You!



- ▶ The Rose Rosette Disease Task Force
- Making great strides in improving the sensitivity and reliability to detect the virus in the plant.
- Prototypes of these new techniques are being tested at Texas A&M and Oklahoma State University
- RRD Monitoring Program has hundreds of volunteers from 34 of 48 states reporting the incidences of RRD to identify disease distribution and cultivar susceptibility
- Participants include HRS members



# RRD – Research Science Helping You!

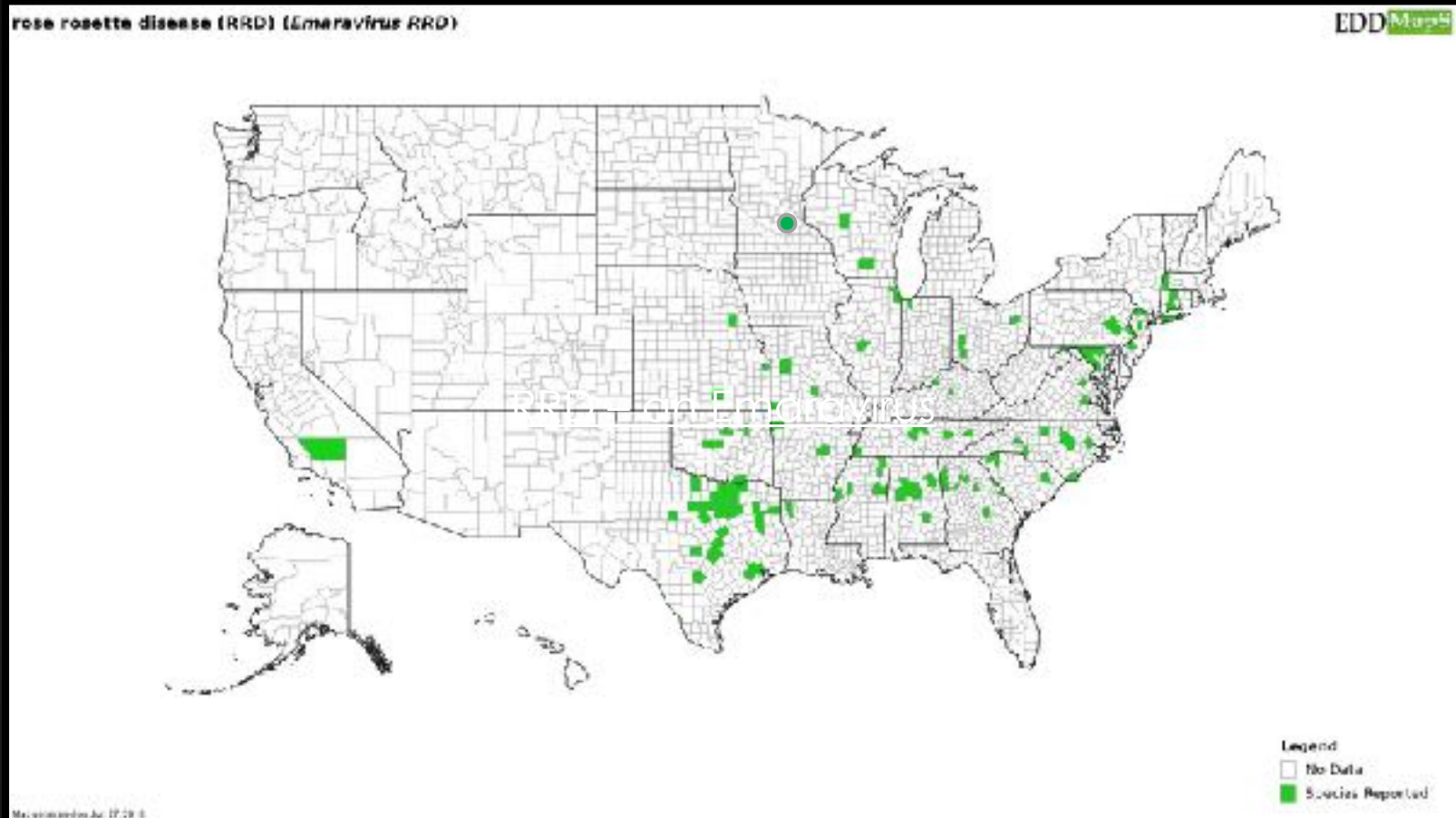
- University of Tennessee is studying the movement of the virus and the mite to develop a set of best control practices
- Trials are underway around the country to identify plants that may be resistant to RRD so that breeders may incorporate the genetics from these cultivars into new breeding programs

Dr. Mark Windham  
Univ of TN; RRD evaluation



Ellen Roundey, HRS  
Scholarship Recipient

# RRD – Where is it (U.S.)?



Roserolette.org distribution map



# RRD - Symptoms



Thickened canes  
(may not always be present)



Premature bud development

# RRD – What to do?



It is impossible to visually tell whether the virus is localized or systemic therefore removal is the best option

For roses with sentimental value

Remove the symptomatic stem well below the point of infection (all the way to the plant base if possible)

Disinfect pruning equipment with 1/4<sup>th</sup> cup bleach mixed with 2 1/4<sup>th</sup> cups water between cuts

Carefully monitor plant for recurrence. If symptoms reappear dig up and destroy the plant



# RRD – Prevention



Do not plant roses too close together as this increases the chance that mites will move from one plant to another

Do not use leaf blowers around plantings where RRD has been diagnosed. Rake & bag debris.

Mites travel on tools, gloves and clothing. Do not go from an infested garden to a healthy garden without changing clothes. (Preferably go to the healthy garden the next day.)

Prune roses where RRD has been diagnosed heavily in the early spring to remove any over-wintering mites

Apply dormant oil after pruning and horticultural oil in spring to reduce mite populations

# RRD – What to do?

The **CORRECT** way to remove a bush with a confirmed diagnosis of RRD

Tie the bag shut at the bottom

Saw it off at the base

Infected plant + mites contained inside the bag





# RRD RESISTANCE STUDIES



These roses have proven to be resistant to RRD in multi-year virus challenges

# RRD RESISTANCE STUDIES

Little Buckaroo  
(Miniature)



Fru Dagmar Hastrup  
(*Rosa rugosa*)



Sunny Knock Out  
(shrub)





# RRD RESISTANCE STUDIES

Winter  
Sun (HT)



Hansa  
(*Rosa rugosa*)



Moje Hammarberg  
(*Rosa rugosa*)

# RRD RESISTANCE STUDIES



*Rosa setigera* (species)  
Courtesy of Illinois Wildflowers



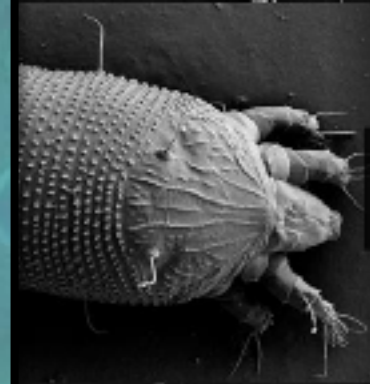
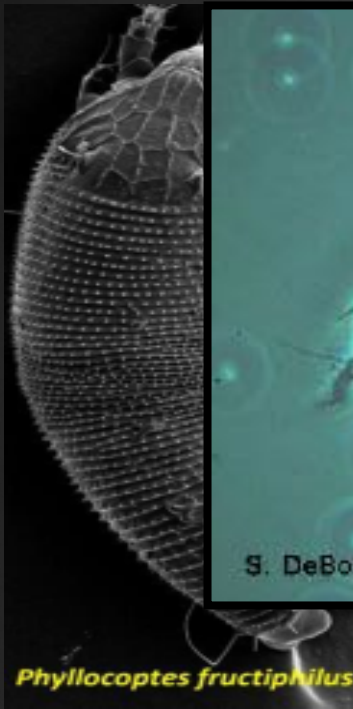
*Rosa palustris* (species)  
Courtesy of Illinois Wildflowers



# THE PRIMARY VECTORS ERIOPHYOID MITES

*Phyllocoptes fructiphilus*

*Eriophyes eremus* – NEW



Since the mite is the primary means of infection - eliminating the mite makes sense

**FIGHT  
THE MITE**

photos - Gary R. Bauchan and  
Ronald Ochoa (USDA ARS)

# Mites and the I-20 Bright Line

North of Interstate 20 (Dallas & Ft. Worth) has been the epicenter of the current outbreak....Why?

Abundance of vectoring mites at various relative humidity levels has been poorly understood until recently

Population – number of mites per sepal highest when RH is 60% and lowest at 95%

Symptoms are highest when RH is 95% and lowest when RH is 20%



Monterrosa, et al 2021

Shirnat Joseph, NCPN June 2022



# Witches Broom



This stem was hiding inside a densely packed bush



Witches' Broom Can Stand Out or be Subtle

# The RRD Affect on Roses



## Localized infection

- Mite feeds on single cane
- For a short time, virus may be restricted to that one cane
- As feeding continues – more tissue is damaged until plant succumbs

## Systemic infection

- Affects the entire plant from root to canopy

**Plant parts showing no symptoms may actually test positive for the virus and vice versa**

There is no way to know if infection is localized or systemic

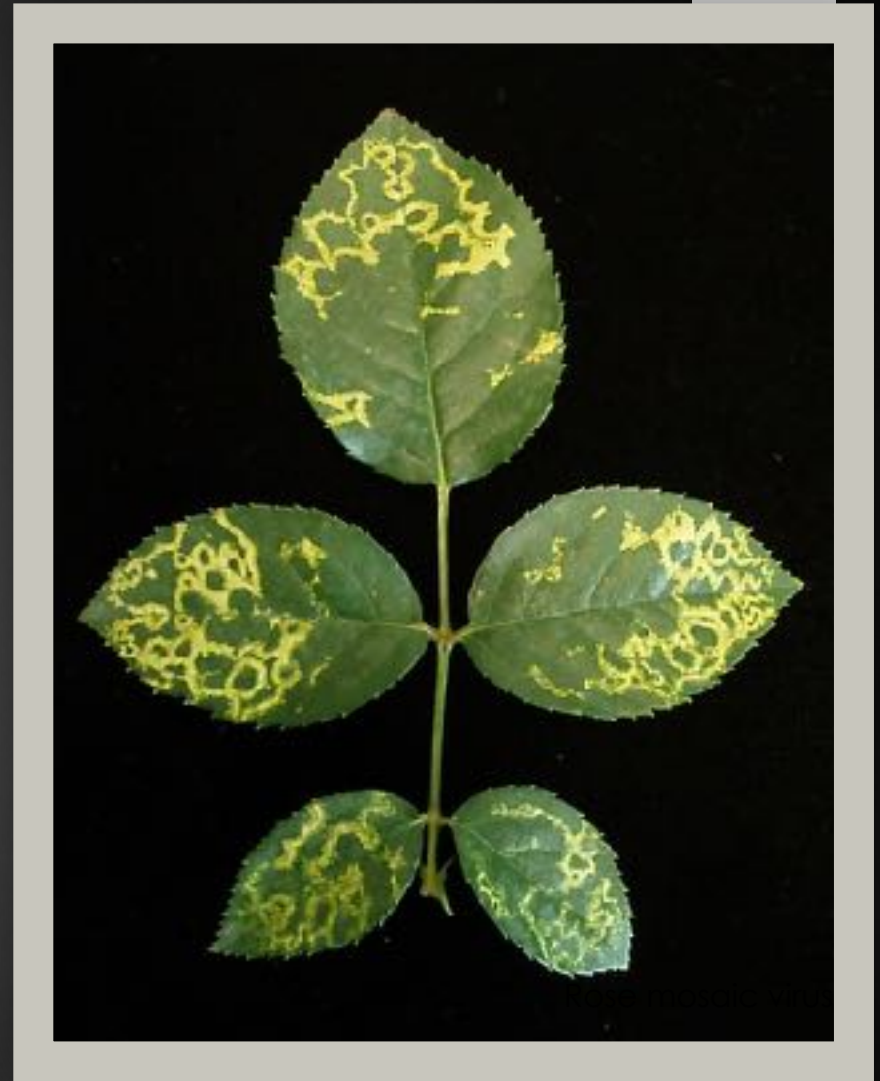


# VIRUS

VARIEGATED  
FOLIAGE IN ROSES IS  
NEVER A GOOD  
THING

-

ALMOST ALWAYS  
ASSOCIATED WITH A  
VIRUS



Rose mosaic virus