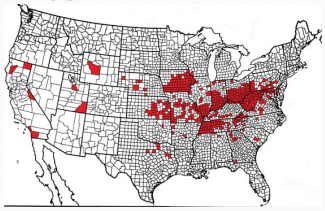
Rose Rosette Disease

History of Rose Rosette Disease

- First reported in Manitoba, CA in 1940
- Reported in the U.S. shortly afterward
- Now common in many parts of the U.S.
- Has become more common in Dallas/Ft.Worth area in recent years



2002 RRV distribution

Rose Rosette Disease

- *Rosa multiflora* planted as a hedgerow for erosion control and as a natural fence in first half of 20th century
- *R. multiflora* is now well established all over the US and may be the most susceptible host of RRV

Multiflora rose

Rose Rosette Disease

- Caused by a virus
- Transmitted by eriophyid mites
- Affects all rose varieties
- Typically kills roses (takes a few months to a few years)
- Symptomatology is variable

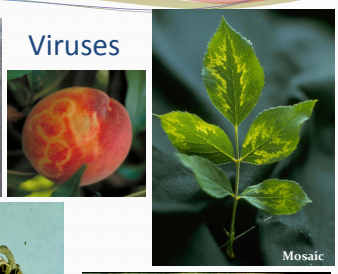
VIRUSES AND VIROIDS

- Characteristics:
  - Sub-cellular, composed of genetic material (DNA or RNA) surrounded by protein coat
  - Replicate by "hijacking" plant DNA
  - Require wound to initially enter plant cell
  - Require living host
- Spread
  - Aphids, leafhoppers, and other insects
  - Contaminated pruning tools
  - Grafting
  - Pollen and/or seed (vertical transmission)

Symptoms of Virus and Viroid Infection in Plants

- Ringspot
- Mosaic
- Mottling
- Streaking/Striping
- Chlorosis
- Vein-clearing
- Leaf spots
- Reduced yield
- Dwarfing/stunting
- Color breaking (streaking in flowers)
- Stem-pitting (pits and grooves in phloem)
- Spraing (necrotic spots and patterns in tubers)

Viruses



VIRUSES AND VIROIDS

Diagnosing viral diseases:

- Rule out other causes (fungi, bacteria, insects, physiological stress factors)
- Look for vectors of the virus (when known)
- Perform serological or molecular laboratory testing for confirmation

Transmission

- Primarily transmitted by mites
- Can also be transmitted by grafting
- *Phyllocoptes fructiphilus* is the mite vector
  - Very small (cannot be seen without a microscope)
  - Short distance dispersal - crawling
  - Long distance dispersal - wind, on other insects, and movement of plants
  - Feed in protected areas on young tissues
  - Several generations/year

Miticides

- Avid (Abamectin IRAC-6)
- Horticultural oils

Symptoms

- Witches brooms
- Increased thorn production
  (often softer, more pliable thorns)
- Thickened canes
- Diminished leaf size
- Deformed/distorted leaves and flowers
- Increased red coloration to tissues
- Shoot elongation
- Death of tissues

**increased redness does not occur on some ornamental roses
*** does not occur on R. multiflora

Increased thorn production

Symptoms

Red shoots, rapid shoot elongation, witches broom

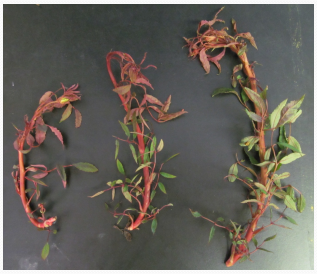
Increased tissue redness, increased thorniness

- Witches broom
- Distortion of flowers (enlarged calyx)

- Witches broom
- Tissue necrosis
- Small, distorted leaves

- Reddened leaf tissues
- Leaf distortion (enhanced serration, altered shape)
- Blighted blossom

- Shoot and leaf curling (epinasty)
- Increased red coloration
- Diminished leaf size



Testing for Rose Rosette

- Symptom expression
- Observation of eriophyid mites
- Molecular PCR test for RRV

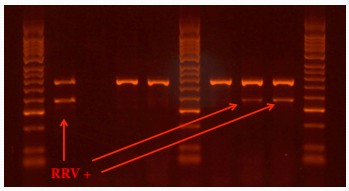


Photo by A. Brake

Management of RRV

Current recommendations for managing this disease:

1. Remove confirmed and/or symptomatic plants early after observation including roots (bag and discard; do not compost).
2. Treat adjacent plants with miticide to reduce probability of transmission by eriophyid mites (use abamectin or horticultural oil). Please note: this will not stop the virus, if it is already in the plant.
3. Remove any wild roses in the vicinity of cultivated roses.
4. Monitor (weekly) for symptoms and act quickly when and if symptoms are observed.

We can use your help

If you find a rose suspected of having rose rosette, please:

1. Record location and take photo
2. Email me: mgiesbrecht@tamu.edu
3. Inform county extension agent and/or send us a sample

Help an undergraduate student project!

Other rose problems

- Powdery mildew
- Downy mildew
- *Phytophthora* root rot
- Herbicide damage
- Black spot

Herbicide damage

Small, distorted leaves

Rose mosaic virus

Leaf mosaic

Powdery mildew

Usually caused by: *Sphaerotheca pannosa* var. *rosae*

Black Spot

Caused by:
Diplocarpon rosae

Round, brownish, necrotic spots

Questions???

Texas Plant Disease Diagnostic Lab contact information:

1500 Research Pkwy. Suite A130
College Station, TX 77845
(979)-845-8032
http://plantclinic.tamu.edu/
Email: plantclinic.ag.tamu.edu

THANK YOU!!!

References

Ahn, K.K., Kim, K.S., Gergerich, R.C., Jensen, S.G., Anderson, E.J. 1996. Comparative ultrastructure of double membrane-bound parti- cles and inclusions associated with eriophyid mite-borne plant diseases of unknown etiology: a potentially new group of plant viruses. J Submicrosc Cytol Pathol 28:345–355

Allington W.B., Staples R. and Viehmeyer G. 1968. Transmission of rose rosette virus by the eriophyid mite Phyllocoptes fructiphilus. J. Econ. Ent. 61: 1137–1140.

Amrine J.W., Hindal D.F., Stasny T.A., Williams R.L. and Coffman C.C. 1988. Transmission of the rose rosette disease agent to Rosa multiflora by *Phyllocoptes fructiphilus* (Acari: Eriophyidae). Ent. News 99: 239–252.

Chaturvedi, Y., Singh, M., Rao, G. P., Snehi, S. K., and Raj, S. K. 2009. First report of association of 'Candidatus Phytoplasma asteris' (16SrI group) with little leaf disease of rose (Rosa alba) in India. Plant Pathology 58:788–788.

Conners I.L. 1941. Twentieth Annual Report of the Canadian Plant Disease Survey 1940. Domain of Canada Department of Agriculture Science Service, Division of Botany and Plant Pathology, Ottawa.

Epstein A.H. and Hill J.H. 1995. The biology of rose rosette disease: A mite-associated disease of uncertain aetiology. *Journal of Phytopathology* 143:353-360.

Epstein, A. H., Hill, J.H. and Nutter, F.W. Jr. 1997. Augmentation of rose rosette disease for biocontrol of multiflora rose (Rosa multiflora). Weed science 45(1): 172-178.

Gao, R., Zhang, G. M., Lan, Y. F., Zhu, T. S., Yu, X. Q., Zhu, X. P., and Li, X. D. 2008. Molecular Characterization of Phytoplasma Associated with Rose Witches'-Broom in China. Journal of Phytopathology 156:93-98.

Golino, D., Cunningham, M., Rowhani, A., and Sim, S. 2005. Transmission of rose mosaic viruses. Pages 217-224 in: IV International Symposium on Rose Research and Cultivation 751.

Kamińska, M., Podwyszyńska, M., and Śliwa, H. 2005. Phytoplasma detection in rose shoots propagated in vitro. Acta Societatis Botanicorum Poloniae 74:181-186.

Keifer, M. M. 1975. Eriophyoidea. In: L. R. Jeppson, M. M. Keifer, and E. W. Baker (eds.). Mites Injurious to Economic Plants, pp. 327- 396. Univ. Calif. Press. Berkeley.

References

Laney, A. G., Keller, K. E., Martin, R. R., and Tzanetakis, I. E. 2011. A discovery 70 years in the making: characterization of the Rose rosette virus. Journal of General Virology 92:1727-1732.

Rohozinski J., Epstein A.H. and Hill J.H. 2001. Probable mechanical transmission of a virus-like agent from rose rosette disease-infected multiflora rose to Nicotiana species. Ann. Appl. Biol. 138, 181–186.

Shvanderov,E A. 1975. The role of phoresy in the migration of eriophyid mites (Eriophyoidea).J. W. Amrine, ed. Zool. Zh. 54:458-461. [In Russian]

Silvestro, S.R. and Chapman, G.B. 2004. A transmission electron microscope study of "New Dawn" climber rose (*Rosa wichuraina* x *safrano*) exhibiting rose rosette disease. Plant Cell Rep. 23:345-351.

Thomas H.E. and Scott C.E. 1953. Rosette of rose. Phytopathology 43:218–219.

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