



First in a Series: An In-Depth Look at the NCPN Crops

As we launch into a new year of the NCPN Network News, we are excited to embark on a series that will better familiarize you with each of the crops represented in the Network. In this issue, contributors from NCPN-Roses share information on this specialty crop, the viruses that are being combated, and the people who work diligently to keep this prized ornamental healthy and productive. In future issues, watch for additional specialty crops to be featured, and learn more about how NCPN is helping sustain U.S. agriculture by supporting and promoting the production of virus-indexed propagative material.

Roses, our prettiest crop!

We are proud of all NCPN products, but arguably, rose is the most beautiful crop represented by the Network. After all, its *raison d'être* is beauty and that beauty is recognized throughout world history and culture: in countless pieces of art, literature, and music; integral to gardening, cooking, and perfume; a popular female name and color description. Roses have long been associated with English hierarchy, most infamously illustrated by The Wars of the Roses waged in the late 1400s, in which rival branches of the House of Plantagenet were represented by either the red or white rose.



Fun Facts about Roses

- A rose fossil was found in Colorado with the age of about 35 million years.
- In nature, the genus *Rosa* has some 150 species spread throughout the Northern Hemisphere, from Holland to Mexico and North Africa
- Roses can survive for extremely long periods of time. For example, a large rose bush covers the wall of the Cathedral of Hildesheim in Germany and has done so for over 1000 years.

Garden roses are an important ornamental plant that contribute significantly to our environment and economy. They add to the beauty of public spaces and private homes, improving quality of life for many people. Roses are also the foundation of the multi-billion-dollar landscape and shrub industry. A 2009 survey of US commercial rose nursery production found that the nursery value in sales of roses was \$203 million and the annual value is estimated at \$400 million (AmericanHort.org). The garden rose nursery industry is investing significantly in rose breeding programs nationally and internationally, which are resulting in disease-resistant roses that require minimal chemical inputs.

Rose Viruses

Rose viruses are common in garden roses and are easily transmitted by propagation. Several viruses are found worldwide, including *Prunus necrotic ringspot virus (PNRSV)*, *Apple Mosaic Virus (ApMV)*, and *Rose spring dwarf-associated virus (RSDaV)*. For the rose hobbyist, the problems caused by common rose viruses can include unsightly foliage, decreased vigor, and smaller and/or fewer flowers. The problems caused by virus are even more serious for professional rose growers and nurseries. For cut flower producers, there may be a significant decrease in the production or quality of the blooms, depending on the rose variety and the type of virus(es). Nursery plant producers may face rejection of interstate shipments and eventual destruction of large numbers of unsalable plants. Rose nurseries cannot afford to have the quality of their product compromised by virus infection.

Most recently the viral causal agent of Rose Rosette Disease (RRD) was described. RRD has been known since the 1940s, but no causal agent could be identified. Ioannis Tzanetakis at the University of Arkansas, using modern technology, found a novel plant virus, Rose rosette virus (RRV), to be the causal agent. RRD has emerged as a major threat for U.S. rose growers, landscapers and consumers east of the Rockies. It now threatens to decimate the U.S. rose industry. RRV is transmitted by a wind-blown eriophyid mite (*Phyllocoptes fructiphilus*). RRD has devastated roses in several key botanical gardens and other large public and private gardens. Unlike other rose diseases, RRD can result in death of rose plantings within two to three years of infection. The garden rose industry understands that the effects of these viruses can be significant to the success of the commercial rose nursery business and the adoption of disease resistant, healthy roses in sustainable garden sites.

There are a number of viruses that have, so far, only been reported in Europe, Africa, Australia, and New Zealand. Scientists and regulators in the U.S. are working hard to keep these agents at bay, to prevent severe symptoms such as fissure, curly head, little leaf, rose bud proliferation, and rose flower break from entering domestic nursery stock.



Example of excessive thorniness caused by RRD is shown on the stem on the left, compared to normal growth shown on the right. (Positive RRD identification provided by the Texas Plant Disease Diagnostic Lab.)



Example of 'Witch's Broom' formation caused by RRD.

(Photo courtesy of Dr. Mark Windham, Ornamental Pathology, University of Tennessee)

NCPN Roses

Clean Plant Centers in the NCPN Rose network ensure that valuable rose cultivars are available as virus-tested G1 stock for a clean source of propagation buds and rootstock. G1 is the reference indicating the plant stock is a first generation propagation of the virus-tested mother plant. Rose nurseries and propagators use G1 stock to produce G2 stock under stringent conditions.

Roses joined the National Clean Plant Network in 2015 when Deborah Golino, of University of California Davis, Dave Byrne of Texas A&M University, and five members of the rose industry in the United States got together and submitted a joint proposal to NCPN. Texas A&M University (TAMU) is home to the largest public rose breeding program in North America as well as the Earth-Kind testing program. Earth-Kind has the focus of identifying and promoting the rose cultivars that are well adapted to the southern U.S. growing environment. Recent efforts to include more northern climates have been coordinated by David Zlesak of the University of Wisconsin–River Falls.

David Byrne, Chair of NCPN-Roses, holds the Basye Endowed Chair in Rose Genetics and has worked for more than 20 years in the Rose Genetics at Texas A&M University, training students and visiting scientists. His breeding collection consists of the Robert Basye rose germplasm, the Ralph Moore rose germplasm collection, and a wide array of roses collected for their disease resistance and heat tolerance. This collection has between 300-400 accessions. In addition, local nurseries maintain large collections of roses—recently released cultivars, Earth Kind roses, Buck roses, and many of the standard old garden roses.

Deborah Golino, Vice-Chair of NCPN-Roses, is the Director of Foundation Plant Services (FPS) at UC Davis. FPS provides the largest public collection of virus-tested roses in the United States and possibly the world. The current collection covers eight acres and includes 552 rose scion cultivars and seven understock cultivars. Rose clean plant material has been distributed to 30 states, as well as internationally. Each year new cultivars are added to the collection after virus testing and, if necessary, virus elimination treatment.



David Byrne and Steve Hutton, at Star Roses in Pennsylvania, August 2017.



David Zlesak, Deborah Golino, Brent Pemberton, and Sue Sim at Longwood Gardens in Pennsylvania, August 2017.

Unique Outreach Possibilities

The majority of specialty crops represented in the Network are fruit crops (berries, citrus, grapes and fruit trees). Other Network crops include hops and sweet potato. However, rose is the only exclusively ornamental crop currently part of the NCPN system, and thus enjoys a unique connection to the end consumer. As Sue Sim, the NCPN Grape Coordinator, explains, “NCPN-Grapes deals directly with nurseries, growers and wine makers, but not usually wine consumers.” Thus, NCPN-Roses has an opportunity to interact directly with end-users in outreach activities.

One such opportunity is working with the American Rose Society (ARS), which boasts almost 11,000 members, a majority of whom are home gardeners. The ARS generously hosted the annual NCPN-Rose meeting at the American Rose Center in 2016. During the 2017 annual meeting at Longwood Gardens, Pat Shanley, President of ARS, expressed a willingness of the ARS to help with the Education & Outreach efforts of NCPN-Roses. Opportunities to link the Network to national groups who also have members with similar interests may exist. ARS and public gardens across the country are ideal ambassadors for reaching not only rosarians, but also home gardeners and commercial landscapers, and communicating the importance of using clean plants. These organizations expand our reach by sharing the clean plant message via social media, web sites, tours, meetings and other avenues. This effort is further supported with the presence of Pam Allenstein, a Public Garden representative on the NCPN-Roses Advisory Board.



NCPN Rose Clean Plant Centers:

Foundation Plant Services at University of CA, Davis

<http://fps.ucdavis.edu/>

The Texas Plant Diagnostic Lab at Texas A&M

<https://plantclinic.tamu.edu/>

Other collaborators, stakeholders, and valued resources:

American Rose Society

<http://www.rose.org/>

Longwood Gardens

<https://longwoodgardens.org/>

Texas A&M Rose Program

<https://www.facebook.com/tamuroses>

Combatting RRD

<https://facebook.com/CombatingRoseRosette/>

AmericanHort Association

AmericanHort.org



Meetings

The first meeting of the NCPN Roses Tier 2 Advisory Board occurred in 2015 in Davis, California. Board members and leaders were approved along with a charter for the group. All participants toured FPS facilities and the extensive virus-tested rose collection that is located there.

In 2016, the Tier 2 Board met in Shreveport, Louisiana at the headquarters of the American Rose Society. Goals for NCPNR were prioritized and updates on virus testing and the current virus-free collections were presented and discussed.

The most recent meeting of the Tier 2 Board was in August 2017 at Longwood Gardens in Pennsylvania. Updates were presented for rose survey activities, the virus-free rose collections with a historical perspective, and the NCPN program along with the Farm Bill process. Charter revisions and election of the Chair and Co-Chair along with new Board Members were discussed and approved. There were extensive discussions concerning diagnostic testing procedures, plant certification programs, and overviews on existing, new, and emerging rose disease threats. The NCPN funding process was also discussed along with Education & Outreach activities.



NCPN-Roses Advisory Board and Industry Members

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David Byrne
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Dan Waterhouse
Neuhouse Farms

Tim Wood
Spring Meadow Nursery

Matt Woolf
Woolf Nursery

David Zlesak
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A Look Ahead: *What's Happening in the Network*

- **January 21-23, 2018** [56th National Sweetpotato Convention](#) and NCPN-SP Meeting, Wilmington, NC
- **January 23-26, 2018** [62nd Annual American Hop Convention and Hop Research Council Winter Meeting](https://www.usahops.org/convention/), Palm Desert, CA
- **January 23-25, 2018** [Unified Wine & Grape Symposium](#) Sacramento, CA
- **Also:** see the new [High Throughput Sequencing \(HTS\) Fact Sheet](#), now posted on [NCPN](#) site

National Clean Plant Network

USDA-APHIS-Plant Protection
and Quarantine
Science and Technology

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