



New year, new opportunities! And there is much to celebrate as the National Clean Plant Network looks ahead. As you will learn in this issue, Sweetpotatoes will be benefiting from new capacity in Hawaii; for the first time, Hops will be able to eliminate some particularly harmful viroids; Citrus is introducing a streamlined process for virus detection; Fruit Trees is digging in to establish standards for foundation collections across that network, Berries is being proactive to ensure exports will continue to be permitted as EU standards tighten, and Grapes has introduced a group of cultivars resistant to Pierce's disease.

Meanwhile, special initiatives continue improving cross-cutting processes for the Network as a whole, such as the economic studies underway to help clarify and raise awareness of the value of using pathogen-testing propagation material. The NCPN website is undergoing a total renovation and the NCPN Strategic Plan has been completely reimagined so that all crop participants can better collaborate to ensure the Network continues to support the needs of U.S. agriculture. Stay tuned for more about these activities in future issues.

New Sweetpotato Facility Added in Hawaii

NCPN recently announced support for a Sweetpotato facility at the University of Hawaii's Hilo location. Focus will be on 'Okinawan', the primary commercial cultivar in Hawaii. At the location, they will introduce four, dark purplish fleshed 'Okinawan' genotypes and propagate/distribute a total of 500 virus-tested, tissue-cultured plantlets to cooperating extension agents that will grow the plants using either pot or hydroponic culture to multiply to 2,500 cuttings for distribution to growers. Collaborating Coordinator for the project is Dr. Susan Miyasaka at the University of Hawaii.

Improved Viroid Elimination for Hops

Over the past two years, the Clean Plant Center Northwest at Washington State University has been studying the tissue distribution of hop stunt viroid and hop latent viroid in commercial hop cultivars. We are using this information to develop improved protocols for eliminating these pathogens from hop germplasm. We have found that a combination of prolonged cold temperature (4 °C) treatment and excision of the L1-L3 meristem, followed by regeneration, can produce plants free of both viroids. This is a significant development for NCPN Hops as prior to this, elimination of hop viroids was not possible, and it has also been effective in simultaneous elimination of other hop viruses.

Economic Benefits of Clean Hop Plants

The NCPN Economics Initiative group, led by Dr. Miguel Gomez at Cornell University, has completed a study of the economic benefits of using virus-tested hop germplasm to control hop stunt viroid. They found that HSVd can cause losses of between \$423 to \$26,795 per acre, depending on disease impact and hop variety infected. The yield losses caused by HSVd, and the need for replanting once losses pass 35%, easily justify investing in hop planting material.



Pierce's Disease Resistant Grapevine Cultivars Released

Five Pierce's disease (PD) resistant grapevine cultivars have been released by the University of California, Davis. They have passed all tests and are available as certified, clean material from Foundation Plant Services. The new cultivars were developed by Dr. Andy Walker using classic breeding techniques to confer PD resistance from the North American wild grape species *Vitis arizonica* to the cultivated winegrape *V. vinifera*. The five newly released cultivars include three red winegrapes and two white winegrapes that have demonstrated resistance to PD in greenhouse and field evaluations and have shown high fruit and wine quality. These cultivars will be particularly sought-after by growers in regions where PD is widespread and where the existing resistant winegrapes lack the potential to make quality wine. Walker explains, "These new varieties are far more resistant than any existing alternatives and have excellent wine quality that has been affirmed at tastings with industry renowned California winemakers."

[Complete cultivar descriptions \(PDF\)](#)



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PIERCE'S DISEASE RESISTANT WINEGRAPE
(VITIS VINIFERA)

CAMMINARE NOIR (UC Case No. 2020-049)
(Selection 07355-075)

This red wine grape is 94% *V. vinifera*, makes wines with characteristics of both Cabernet Sauvignon and Petite Sirah and is resistant to Pierce's Disease. It is established in large test plots along the Napa River and commercial scale wines have been made from this plot. This selection is one of the earliest to break dormancy, and it also blooms and ripens early. The berries are relatively large and the well-filled clusters are medium in size. This selection has been repeatedly tested in a UC Davis greenhouse screen and is highly resistant to Pierce's Disease. It has ranked highly at numerous tastings of both Davis and Napa grown fruit. Tasting notes include: dark-red purple color, bright red fruit, raspberry, cherry, ripe, tannic, elegant rather than dense.

Technical: This variety was bred by Dr. Andrew Walker and is 50% Petite Sirah and 25% Cabernet Sauvignon.

US Patent Pending

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High-Throughput Sequencing as a Citrus Clonal Protection Program Routine Diagnostic Tool for Variety Introduction

The citrus industry is under constant threat by various pathogens and diseases that can spread quickly through tree propagation using infected plant materials or mechanically through contaminated tools. As a result, it is imperative for the Citrus Clonal Protection Program (CCPP) to utilize new diagnostic tools to streamline the introduction process for the development of pathogen-tested citrus propagative materials. High-throughput sequencing (HTS) is generally accepted in the international scientific and regulatory community as a revolutionary technique that will become the gold standard in plant diagnostics.

HTS is a powerful technology that combines molecular biology and computer sciences and has a wide range of applications. One of these applications that could assist the citrus industry is the detection and identification of multiple citrus pathogens in a sample. One of the biggest challenges with HTS is the data analysis, because it requires in-depth knowledge of bioinformatics. The goal is to simplify the data analysis so that plant pathologists with no background in bioinformatics can determine the presence or absence of a particular graft-transmissible citrus pathogen. This is achieved using a program called E-probe Diagnostic Nucleic Acid Analysis (EDNA). The program is a user-friendly web interface that can detect pathogens of interest from raw sequencing data. EDNA eliminates the need for a dedicated server and bioinformatician to perform the diagnostics. In addition, results are obtained much faster compared to traditional bioinformatic workflows. A comprehensive collection of EDNA libraries for citrus pathogens will be needed in order to fully implement the EDNA technology for labs involved in citrus diagnostics. And regulatory approval will be required to ensure this methodology can perform as well or better than the current diagnostic techniques.

NCPN Fruit Tree Developing Standards to Ensure Viability of Foundation Collections

In September 2020, the National Clean Plant Network Fruit Tree Tier 2 met to begin work on establishing a Network standard for foundation collections. The Tier 2 group is comprised of representatives from fruit tree growers and producers, regulators, and the three NCPN Fruit Tree Centers: Clemson Clean Plant, Clean Plant Center Northwest, and Foundation Plant Services.

The group discussed how the programs serve the NCPN mission of protecting the U.S. fruit tree industry from harmful virus and virus-like pathogens, while balancing stakeholder needs for virus-tested propagative materials and nursery stock. Over the two-day meeting, the group debated how to support the interests in both public and proprietary fruit varieties, and discussed the challenges of balancing proactive measures to prevent infection, assure continued 'clean' status, and provide therapeutic measures to manage disease. The participating Centers recognized the importance of further developing their foundations while facilitating clean plant material movement between every Center and every state.

The group will meet again in the spring of 2021 to continue addressing the action items that were set forth:

- Update and harmonize the fruit tree program testing protocols for entry into a foundation as well as retention in a foundation.
- Compile an NCPN foundation list for public material currently maintained in foundations that would be prioritized by the industry at large, updated yearly to ensure needs are met while eliminating redundancies.

The group is optimistic that more efficient and consistent foundation maintenance processes are in the Network's future.



Fruit Tree foundation material in screenhouse
(Clean Plant Center Northwest, WSU, Prosser WA)

Berry Standards Required by 2023 for Continued Export to EU

It has been a long-standing goal of NCPN Berries to develop a national U.S. standard for the propagation of berry plants. With the European Union (EU) putting a new plant health standard into force in January of 2023, certification standards have captured the interest of the berry industry. Several U.S. berry nurseries and breeders ship plants to the EU and certification standards will be a requirement for future exports.



Fortunately, several members of the NCPN Tier 2 board are actively involved in developing certification standards in their states and have joined in the formation of a Certification Standards Working Group.

Blueberry certification has been identified as a high priority for harmonization, so all states who wish to can meet the EU 2023 deadline and continue to export plants. The Working Group consists primarily of state regulators working in the certification programs from Washington, Oregon, California, Michigan, Pennsylvania, and New York. The Working Group has presented their work-in-progress in several forums, including the most recent WERA-20 (virtual) meeting.

Although the Working Group is independent from NCPN Berries, industry board members have become actively involved, providing valuable input to the developing standards. With the EU 2023 deadline looming, the team is committed to moving certification standards closer to a final product and realizing the goal of a national standard.

The Heritage Rose Collection at Florida Southern College

The heat-therapy program at Florida Southern College (FSC) was started in 1983 with the objective to rid roses of the viruses causing rose mosaic disease. That program continues, and FSC now has a collection of over 300 rose varieties, mostly "heritage" or "antique" types. FSC is not an NCPN-funded center, and efforts have been made to avoid overlap with the foundation rose collection at the University of California at Davis, which emphasizes more popular modern hybrids. The FSC collection is used for teaching plant taxonomy, genetics, and horticulture. The collection is maintained in two landscaped gardens, as well as in a range of greenhouses, on the campus in Lakeland, Florida.

The FSC program has used indexing and testing services at UC Davis and Washington State University for rose mosaic. For the last several years, they have also worked with Dr. Kevin Ong, at Texas A&M University, to test the collection for several minor viruses of roses using PCR techniques. Florida Southern is a private college, with no official mandate to provide propagation material to the nursery industry, but they do it for the love of the roses. Virus-tested rose propagation material has been distributed to at least 22 nurseries in the U.S., as well as to Bermuda, Britain, South Africa, Canada, and Brazil. The older varieties in the FSC Heritage Rose Collection are an important source of genetic material for future rose breeding efforts.



The Jane Elizabeth Jenkins Rose Garden, housing approximately 65 plants on the Florida Southern College campus.



Ruth's Rose Garden, housing approximately 300 plants on the Florida Southern College campus.

NCPN Announces 2021 Cooperative Funding Spending Plans

In early January 2021, the USDA concurred with NCPN's recommended spending plan for fiscal year 2021, under which \$7.1 million in USDA funding shall be made available to 29 cooperators in 17 states and territories. Support is being provided to all seven specialty crop groups currently under NCPN support, as well as four special initiatives—education/outreach, quality management, economics, and the use of advanced diagnostics. This year, NCPN funding is being distributed among the crops and special initiatives as follows:

Berries - \$740,113	Hops - \$252,043
Citrus - \$1,751,359	Roses - \$390,003
Fruit Trees - \$1,352,566	Sweet Potato - \$638,996
Grapes - \$1,569,123	Special Initiatives \$408,226

No new crops entered the Network in fiscal year 2021, though NCPN has extended its support to one new facility at the University of Hawaii, specializing in clean sweetpotato services. The program anticipates concluding all funding agreements with recipients not later than June 30, 2021, with most recipients applying funds to activities beginning just some time thereafter.
