College of Agricultural, Human, and Natural Resource Sciences
Clean Plant Center Northwest

15th April 2022

Dear Stakeholders,

2021 was a difficult year for many, with frustrations due to an inability to travel or meet, upheavals in the global supply chain, and a general sense of uncertainty about the future. For the Clean Plant Center Northwest (CPCNW) it was a transformative year in which we developed and began implementing steps of a new strategic plan focused on sustainability, relevance, and accessibility. Here we wish update you on achievements in 2021 and plans for early 2022:

Online business platform
Key to this effort was the development of a Customer Relationship Management (CRM) system to shift business operations from the paper era to the digital age. The system equips us with tools to perform business transactions, increase the visibility of products and services offered, and streamline communication with customers. Features include user accounts, webforms, reports, and electronic agreements to facilitate proprietary variety management, and an online catalog of available plant material, online payment, and order tracking. Finally, this website will also contain information and factsheets about how to 'start clean and stay clean.'

Upon the launch of this platform, each existing customer will be provided with a login and temporary password to establish their account. Until this time, stakeholders who have introduced material to the center will received monthly email reports of their plant(s) progress.

Importing hop germplasm via the CPCNW
With the addition of Hop stunt viroid in *Humulus lupulus* (Common Hop) to the USDA-APHIS 'Not Authorized Pending Pest Risk Analysis' (NAPPRA) list in July of 2021, the CPCNW applied for and received an amendment to the center's Controlled Import Permit. This allows the CPCNW to import and carry out diagnostic testing on hop germplasm of interest to U.S. stakeholders.

Expanded plant propagation capacity
With generous support from the Washington Hop Commission, and hop industry stakeholders, the CPCNW was able to complete a renovation of a 1960's era greenhouse during 2021. With provision for both heating and cooling, this gives the CPCNW a full four-season greenhouse for propagation of plants for sale and distribution, as well as rapid acclimation and multiplication of foundation stock. We have installed large mist benches in one chamber, allowing us to produce plugs and mist-propagated plants for sale and distribution. In 2021 alone this allowed us to propagate and distribute eight times the number of plugs than in the year prior.

G1 tissue culture products
The CPCNW is happy to announce that commencing with the 2022 summer sale season we will be offering unrooted and rooted tissue culture plantlets as a product for sale to stakeholders. Pricing and product delivery timeframes will be announced soon, please follow our website and social media platforms for more details.

Promoting the use of clean plants by growers
Over the last year, the CPCNW coordinator has worked with the WWIF and WSDA to dispel misconceptions and build awareness of the Washington state's Tree Fruit, Grape, (Hop) certification programs, and highlight the importance of virus-tested material. Beginning in July 2022, the coordinator will spearhead a separate project with WSDA developing and delivering training modules for Tree Fruit, Grapes, Hops certification, and clean plant program. These modules will cover a wide scope of information from virus identification, transmission, best management practices, the importance of virus-tested materials, and certification program resources for end-users in the industry. The CPCNW's push for grower education within the state will be matched on the national

level by a National Clean Plant Network funded joint communications proposal developed by the NCPN-FT, NCPN-Hop, and NCPN-Citrus coordinators. This proposal aims to build connections by working with regulators, industry members to disseminate targeted information to end-users in the three crop groups.

Regulatory protocol changes for fruit tree and grapevine imports

2021 also saw a significant change in the framework and protocols used to test fruit tree and grapevine germplasm imported into the U.S. under a Controlled Import Permit. The new framework removed the requirement for biological indexing for both known, named pathogens, and agents of unknown etiology, significantly reducing the timeframe for quarantine testing of Malus, for example, down from four or five years to a two-year minimum. In place of biological indexing, and to screen for novel viruses or virus-like organisms or novel variants of existing pathogens, a requirement to perform two rounds of High-Throughput Sequencing (HTS) during the quarantine period was introduced. These two HTS rounds, in addition to the existing PCR diagnostic panels, are to be separated by a winter dormancy period, such that one round is performed each year, across two years.

While this change has accelerated the timeframes for potential release of germplasm held in quarantine, it has presented challenges in adapting to the new framework. Imported accessions that were in-progress at the time the framework was introduced require at least one, and in some cases two rounds of HTS, separated by a winter dormancy period. While we were able to preemptively prepare and send samples from some affected accessions prior to the winter of 2021-2022, due to the dormancy and second round requirement additional samples will be needed in 2022. The timeframe extends further for accessions that are known to be infected and require virus elimination.

The requirement for a second round of HTS has placed significant strain on the CPCNW's operating reserves as this was change was not budgeted for either the National Clean Plant Network fiscal year 2021 funding application, nor when fees-for-service were set at the beginning of that year. As such, we must regrettably invoice the sponsors of affected accessions, that is, fruit tree accessions imported prior to January of 2022, for an additional $500 USD per accession to facilitate the additional round of HTS to qualify for release from quarantine.

Virus contamination in apple rootstocks

During 2021 we began an investigation into why the incidence of several apple and pear-infection viruses was so high in pome fruit grown in the U.S., and more specifically, why these viruses were prevalent in accessions submitted to the CPCNW for diagnosis and virus elimination. We began systematically testing apple and pear rootstocks and found high incidence of apple hammerhead viroid (AHVd), apple rubbery wood viruses-1 and -2 (ARWV-1 & -2), apple mosaic virus, and citrus concave gum associated virus (CCGaV). As these viruses lack insect vectors, and as these rootstocks were primarily seed grown, we suspected that their presence may be the result of seed transmission. In late 2021 we tested apple trees for the presence of these viruses, then a) extracted and tested seed from the fruit of these plants, and b) stratified and germinated additional seed to test the resulting seedlings. To date we have confirmed that CCGaV is seed transmissible, being found in the seed coat, embryo, and resulting seedlings. Studies on the other viruses identified are ongoing.

The implications of this finding for the fruit tree quarantine and clean plant programs are twofold: First, apple and pear seedlings have been used in these programs for decades as there were no viruses known to be seed transmissible in these species; the viruses that may be seed transmitted are all relatively recent discoveries, identified by HTS in the past four to five years, and induce little to no disease on most pome cultivars which is why they were not discovered earlier. It is possible that pome fruit that passed through any of the federal quarantine and NCPN clean plant programs prior to 2018/2019 may have one or more of these viruses.

Second, putative seed transmission in part explains why these viruses are so prevalent in the U.S., and in accessions imported into the U.S. from other countries. While it difficult to determine whether a line became infected through grafting onto infected rootstock, or had these viruses already in the scion wood, the issue facing

federal quarantine and clean plant programs is the same: these viruses currently disqualify a plant for release from quarantine, or for entry into a state-run germplasm certification program.

However, this is complicated by need to identify and confirm clonal lines of rootstock for use in quarantine and clean plant programs that are absolutely virus and viroid free. In 2021, the CPCNW tested each rootstock plant for these viruses before use, rejecting almost 75%, but that was quickly found to be time consuming and expensive to perform at the scale needed. The CPCNW and USDA-APHIS PGQP have, from late 2021 into early 2022 been repeatedly screening candidate lines. We have recently produced virus-free non- or semi-dwarfing lines for use and are coordinating with tissue culture programs to multiply these plants. Unfortunately, these plants will not be available immediately, so the CPCNW must advise stakeholders that virus elimination of infected pome fruit cultivars is halted until clean clonal rootstocks are available in quantity. We anticipate that rootstocks for therapy are unlikely to be available until the beginning of 2023 so stakeholders with infected apple or pear accessions currently at the CPCNW that require therapy should consider restarting the clean plant process and source new material that can be propagated on tested rootstocks.

Fee-for-service increases, changes to pricing structure and contracted services

2022 has brought significant increased operating costs to many businesses, including the CPCNW. Salary and benefit costs have increased by approximately 3% this year, and major laboratory supply vendors have increased costs by approximately 10% in for 2022, relative to 2021 prices, as have agricultural product suppliers. This, along with continued disruption to the supply chain that has forced the CPCNW to source needed items from non-preferred or more expensive vendors, requires that we increase the fee-for-service costs for variety introduction and diagnostics, virus elimination, and retention of proprietary varieties, effective April 1st, 2022.

Stakeholders should be aware that the CPCNW is not increasing the price of propagative material, as accessibility to virus-tested propagative material is the core function the CPCNW and its parent organization, the National Clean Plant Network. The CPCNW will however, be passing the cost of any additional testing over and above CPCNW standard operating procedures, facilitating inspections, and the issuance of permits and phytosanitary certificates on to the customer. Furthermore, given the significant time commitment needed to facilitate export of proprietary accessions, the CPCNW will be updating its fee structure for export.

As part of the drive towards sustainability, the CPCNW is also revising the terms and contract language for contracted services including proprietary variety introduction, diagnostics and virus elimination, and retention of proprietary varieties. In the past, the former were open ended agreements with a one-time payment. While this structure functioned well for plants that rapidly cleared the clean plant process, it did not for plants that contained recalcitrant pathogens that are difficult to remove or those that took a long time to accumulate to detectable levels, causing plants to fail at the final diagnostics stage, often after one or more rounds of virus elimination. This results in the unfortunate scenario where the stakeholder is unable to receive their plant, and the CPCNW having expended the fee paid in carrying out the work to date and not having remaining funds to make further attempts at removing these viruses. This is compounded by changes to quarantine regulations that require testing for additional pathogens and or the implementation of new methodologies such as HTS.

From April 1st, 2022, onwards, the proprietary variety clean plant process will be broken into three phases: introduction and initial diagnostics, virus elimination, and final diagnostics. Each phase will require the customer to positively affirm that they wish to continue to the next phase of the clean plant process by electronically signing the relevant contract(s) and paying the relevant fees in effect at the time. Together with being able to see live status updates, owners of proprietary varieties will have greater flexibility in determining whether to continue or discard a given accession each year and be able to pay only for the services that they need.

For the retention of proprietary varieties, we will be offering two services. The first, termed 'proprietary' is for stakeholders whose varieties are protected under a current, valid U.S. plant or utility patent, or plant varietal

protection certificate, or a pending application number for either. In requesting this service, the variety owner allows full disclosure of the varieties' presence CPCNW facilities on publicly viewable websites and documents.

The second, termed 'private' is for stakeholders whose varieties have not been patented, and disclosure of information will be limited to the accession ID and type (e.g., 'apple') on publicly viewable websites and documents. In both cases the material itself is not freely available to the public and will only be distributed upon receipt of a signed distribution agreement from the owner. It should be noted here that given the differences in administrative and operational burden, and the potential liability for the university, fees for each service will be structured accordingly. Finally, all stakeholders should understand varieties that are in the public domain (including heritage varieties or those whose patent term has expired) are not eligible for retention as proprietary or private under these contracted services.

Export Pre-Clearance Service

The CPCNW has, voluntarily and using its own resources, been supporting the export of proprietary fruit tree germplasm for U.S. stakeholders. This activity is not supported by NCPN funding and has become increasingly burdensome as countries increase their phytosanitary testing and inspection requirements. Export is not only an administrative task. It requires input from all CPCNW laboratory and production units, drawing staff away from performing the core functions of the center. As part of the drive for sustainability, the CPCNW is instituting export pre-clearance as a fee-for-service activity. This service will require that stakeholders provide shipment details and up-to-date phytosanitary information by a set date, allowing the CPCNW adequate time to verify the requirements with APHIS and arrange any necessary inspections and tests during the growing season. The stakeholder will then be invoiced for any inspections, diagnostics, and time spent, after which the accession will be eligible for export. Details of the service will be posted soon, but stakeholders should be aware that failure to follow the process and pay the requisite fees will result in export service refusal.

Implementation of voluntary self-assessments

As part of the drive towards sustainability, the CPCNW is implementing a program of voluntary self-assessments in which propagators who multiply and sell varieties that came from G1 foundation stock at the CPCNW are asked to collect and give the CPCNW funds based on the number of plant units sold. As we introduce this program, we request that stakeholders match the 'user-fee' rates implemented by Foundation Plant Services in California, of assessing $0.04 (4 cents) on every plant sold that originated from a CPCNW G1 variety, on a calendar year basis. Several hop propagators have already generously begun self-assessments, giving over $80,000 to the CPCNW in 2021, and major Washington state grapevine propagators have agreed to do so commencing 2022. These assessments are, as stated, voluntary, and to make the process easier, a portal is being created as part of our upcoming web platform.

Note to owners of introduced or retained varieties

Owners of non-public introduced or retained varieties will be receiving a list detailing the status of their plants following this letter, asking whether they wish to continue, remove, replace, or retain material based on the developments described above.

In summary, 2022 is shaping up to be a significant year for the CPCNW as the center modernizes its business operations to match the improvements in infrastructure and scientific processes that we have built in the past five years. We thank those stakeholders who continue to support the center financially and believe in the mission of clean plants for disease management.

Sincerely,

Clean Plant Center Northwest