

Nursery Strategies to Maintain Production and Protect Human Health During the Coronavirus Pandemic

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Abstract

The coronavirus COVID-19 pandemic of 2020 caused a dramatic shift in operating procedures at forest and conservation nurseries throughout North America. Even though nurseries were deemed essential businesses, State and Provincial guidelines required nurseries to implement protocols to minimize the spread of the virus, including social distancing, mask requirements in closed spaces, frequent disinfecting, and monitoring symptoms of workers across all activities within nurseries. In August 2020, a panel of nursery managers from western Canada, western United States, and southern United States participated in a webinar to discuss individual strategies taken to keep workers safe while also ensuring seedlings were lifted and shipped and new seedlings were sown. All nurseries made substantial changes to limit contact between workers and developed contingency plans in case the virus spread within their facilities. Luckily, as of August 2020 no spread was recorded in any participating nurseries. The lessons learned and the steps taken to protect workers during the pandemic are described in this article. Although not without short-term impacts on added costs and decreased efficiencies, the practices implemented should help nurseries be more resilient to future events that may cause similar disruptions to operations.

Introduction

The COVID-19 pandemic that began in early 2020 caused a shift in all facets of life around the world,

including rapid responses from forest and conservation nurseries to increase employee safety while minimizing operational disruption. All aspects of the seasonal nursery production cycle are busy, but the shutdowns and stay-at-home orders started at a critical time when nurseries were shipping the previous crop for spring planting, sowing the next crop, and, in some cases, lifting bareroot seedlings. Thus, it was imperative for nurseries to quickly assess how to keep employees safe and healthy and then implement new policies and practices within a few days.

The agricultural industry in the United States was deemed essential early in the pandemic. For example, the Federal Cybersecurity and Infrastructure Security Agency (CISA) in their August 18, 2020, “Guidance on the Essential Critical Infrastructure Workforce” report specifically listed workers supporting greenhouses as essential employees (CISA 2020). Some States issued guidelines for protecting workers, while other States, such as Oregon, issued temporary rules that all businesses must follow. Oregon’s “Temporary Rule Addressing COVID-19 Workplace Risks” required physical distancing, face coverings provided by the employer, regular cleaning and sanitation of work and common areas, optimizing ventilation, training employees, and performing risk assessments, among other requirements (Oregon OSHA 2020). These rules and guidelines are continually updated with the best available information from the respective governmental agencies such as the U.S. Center for Disease Control and WorkSafeBC,

requiring nurseries to constantly stay up-to-date on changing requirements and adjusting operational practices accordingly.

Very little research has been published on the impacts of the COVID-19 pandemic on the forest and conservation nursery industry, risk of disease transmission in nurseries, or changes to worker safety standards. One study from Europe examined risk of COVID-19 infection for different types of agricultural employees using the U.S.'s Standard Occupational Classification System (SOC 2018). The study found that graders and sorters of agricultural products perform the highest risk activities with 80 percent of their work tasks considered high risk for infection during normal operation (Bochtis et al. 2020). The next most at-risk group were nursery workers, where 43 percent of tasks were considered high risk for infection, followed by front-line supervisors at 29 percent and nursery managers at 20 percent (Bochtis et al. 2020). Given the high risk of infection across many nursery duties, nurseries in North America and around the world have made significant adjustments to protect worker health and safety. Some tasks, such as working in outdoor nursery beds, required minimal changes other than increasing social distancing, mask requirements, and supplying hand sanitizer and decontamination supplies for equipment. Indoor tasks required much greater changes. Kipp (2020) highlighted strategies used by the nursery industry in Oregon, including the use of barriers between employees when social distancing is difficult. Nurseries have also adjusted their seedling shipping operations, including reducing staff so that they can maintain social distancing (Goloski 2020).

To understand how tree seedling nurseries have adjusted to the COVID-19 pandemic, a virtual panel discussion was hosted by the Western Forestry and Conservation Association on August 12, 2020. The panel discussion was part of the 2020 North American Forest and Conservation Nursery Technology Webinar Series, a partnership between the Western Forest and Conservation Nursery Association, Intertribal Nursery Council, Joint Southern and Northeastern Forest and Conservation Nursery Associations, Intermountain Container Seedling Growers' Association, and the Forest Nursery Association of British Columbia. Panelists were geographically dispersed across North America and included bareroot and container operations. The following sections summarize practices and experiences discussed during the webinar.

General Strategies to Protect Employee Health

Each nursery represented on the panel established several practices and policies and procured supplies necessary to minimize potential transmission of the virus among employees. There were many commonalities among the nurseries, including providing all employees with instructions regarding the new expectations and daily communication with employees to ensure they fully understand and comply with all policies.

Nurseries set up handwashing and sanitation stations around the facility (figure 1) with anti-viral sprays, hand sanitizer, and/or hand soap. One nursery noted the importance of a label to identify the contents of each bottle, provide instructions for its use, and warn that it is not safe for consumption. Additionally, employees can be supplied safety data sheets from the product manufacturer.

Work areas and equipment are disinfected multiple times per day including before and after each use (in case an employee neglects to do it), at each break, and at the end of each shift so it is clean for the next worker. One nursery places an anti-viral spray bottle at each workstation and requires everyone to spray down their area when they leave. One nursery has the policy: "if you touch it, you clean it." Sharing supplies, even pens and paper, has been discontinued.

Nurseries regularly perform health checks on all employees. These checks include administering health questions via phone 24 hours before work commences and/or before entry on site and taking temperatures daily or if a person appears sick. One nursery informs employees upon hiring or first reporting to work that they should not come to work until tested if exhibiting potential COVID-19 symptoms per government health guidelines. The same nursery asks all employees how they are feeling upon arrival for work each day. If an employee develops symptoms at work, they take the government screening questionnaire and, if appropriate, leave work to get tested before returning.

All employees are provided with personal protective equipment (PPE) such as masks, face shields, gloves, and sanitizers. PPE is issued to each employee just like safety vests. For most nurseries,



Figure 1. To facilitate social distancing and reduce the risk of virus transmission, nurseries set up (a) outdoor and (b) indoor wash stations, (c) outdoor break areas (note tape on table to designate social distancing), and (d) portable breakrooms. (Photos by Jacky Friedman 2021)

masks are required inside but not outside if they can keep 6-ft (2 m) social distancing. If employees can maintain minimum social distance in the greenhouse, masks are often not required. Nurseries arranged for fabric masks to be made and/or bought

surgical masks and face shields online. Availability of N-95 masks has been very limited, so nurseries have had few, if any, to use. One nursery noted that the best approach is to maintain adequate distance or use physical barriers whenever possible because

masks can be uncomfortable, especially when the weather is warm.

To facilitate social distancing, mobile bathrooms and break rooms were brought to some nurseries (figure 1). Also, outdoor break areas were established at one nursery with tape placed on the table where employees could sit and maintain a 6 ft (2 m) distance between each other (figure 1), and breaks have been allowed in private vehicles. Additionally, one nursery removed their vending machines and water dispenser and keeps sanitation supplies by the microwave to sanitize the microwave and other surface after each use.

Documentation is an important aspect of daily COVID-19 policies. Nurseries keep records of wellness checks (figure 2), inspection of sanitation stations, etc. Documentation will help with contact tracing should it be necessary. Adding this documentation to the seedling-growing documentation already required is onerous but is important and necessary for managing the situation.

Question: Are you experiencing cold, flu or Covid-19 like symptoms, even mild ones? Symptoms include: fever, chills, shortness of breath, sore throat or painful swallowing, stuffy or runny nose, loss of smell, muscle aches, fatigue, loss of appetite.

Employee	9-19	9-20	9-21	9-22	9-23
Nathan	/	/	/	/	/
Sean	/	/	/	/	DD
Ron	/	/	/	/	/
Pat	/	/	/	/	/
Steven	V-5	/	/	/	/
Bill	/	/	/	/	DD
Faul	/	/	/	/	/
Regan	/	/	/	/	/
Carmen	/	/	/	/	/
Javier	/	/	/	/	/
Nicolas	/	/	/	/	/
Paul	/	/	/	/	/
Claud	/	/	/	/	/
Neil	/	/	/	/	/
Carlos	/	/	/	/	/
Cathy	/	/	/	/	/
Pamela	/	/	/	/	/
Dennis	/	/	/	DD	DD
Marina	/	/	/	DD	DD
Gerald	A-C	A-C	/	DD	DD
Joyce	/	/	/	/	/
Helene	/	/	/	/	/
Cyndi	A-C	/	/	DD	DD
Alex	/	A-C	/	DD	DD
Mac	/	A-C	/	DD	DD
Pablo	/	/	/	/	/
Heriberto	/	/	/	/	/
Alfredo	/	/	/	/	/
Jorge	/	/	/	/	/
Ignacio	/	/	/	/	/
Agnes	/	LC	/	/	/
Anna	/	/	/	/	/
Karen	/	/	/	/	/
Thomas	/	/	/	/	/
Don	/	/	/	/	/
Manife	/	/	/	/	/

Figure 2. Daily documentation of wellness checks and sanitation practices are part of the nursery COVID-19 strategy. (Photo by Sean Webb 2020)

Strategies to Safely Accomplish Work

Developing a risk assessment for all aspects of daily nursery operations aids in efforts to keep staff healthy. One nursery designated each task as high, medium, or low risk; the closer the working proximity among workers, the higher the risk, such as the example shown in table 1. Using such a risk assessment enables managers to develop safe working procedures for each nursery task. For some nurseries, administrative staff have been able to telework to limit the number of people inside buildings.

As much as possible, work and training activities are conducted outdoors, where employees can maintain social distancing. This is relatively simple for bare-root nurseries because nursery beds are usually 6 ft (2 m) apart and workers can spread out for weeding and other tasks (figure 3). For indoor activities, most nurseries have facilitated extra spacing and created physical barriers between workers. For example, conveyor lines for harvesting, grading, or sowing have been reconfigured to space out the workers. When possible, additional conveyors have been added or have been set up outdoors. For some tasks, productivity is overly compromised with spacing, so barriers have been added when workers must work closer than 6 ft (2 m) from each other (figure 4). Some barriers are stationary but others are mobile so they can be oriented in various ways or relocated as needed to accommodate different tasks and allow people to get in and around them. Mobile barriers allow for maximum flexibility and protection for staff. Barriers have been constructed from 6-mil (0.15 mm) greenhouse poly attached to frames made from PVC irrigation pipe or wood (figure 4). The barriers can be weighted down for increased stability and safety. Other barriers can be constructed to hang between workstations (figure 4).

Establishing work groups (“pods” or “bubbles”) is another strategy during the pandemic. Employees within each pod work together throughout the day and stay separate from employees in other pods. Thus, if one person is infected, the number of others who have been exposed is limited. Similarly, some nurseries are using contract crews (limited to a specific number of people) who are trained to work only in their station area and are expected to stay separate from full-time staff as much as possible. Since the webinar, one nursery shifted employment

Table 1. Sample risk assessment and protocols for minimizing the spread of COVID-19 for different nursery activities.

Activity	Level of Risk	Control Protocols
Management	Low	<ul style="list-style-type: none"> • Implement and manage safety policies • Encourage safe practices outside of work • Consider contract workers instead of temporary workers • Establish work groups (“pods”) • Stagger work schedules • Conduct daily wellness checks • Inspect sanitation stations frequently • Institute paperless timekeeping • Document safety and wellness checks • Post signs on all buildings for hygiene and distancing
Office Administration	Low	<ul style="list-style-type: none"> • Telework when possible • Maintain 6 ft (2 m) distance • Wear PPE • Install plexiglass barriers between workstations and at front desk • Sanitize commonly touched surfaces
Weeding/Thinning	Low	<ul style="list-style-type: none"> • Position workers 6 ft (2 m) apart • Sanitize tools after each use. • Assign tools to individual staff • Provide disinfectant at all job sites • Provide PPE when distancing is difficult
Growing and culturing	Low	<ul style="list-style-type: none"> • Maintain physical distance • Provide PPE when distancing is difficult • Sanitize surfaces after each use
Delivery pickups and drop offs	Low/Moderate	<ul style="list-style-type: none"> • Drop-off and pick-up parcels outside • Eliminate need for signatures or disinfect pens between use • Maintain physical distance when loading a truck • Provide PPE if interaction is necessary
Sowing	Moderate	<ul style="list-style-type: none"> • Position workers 6 ft (2 m) apart • Install hanging screens between individuals • Provide disinfectant at all job sites • Sanitize workstations between shifts • Provide PPE when distancing is difficult • Slow equipment speed to accommodate lower staffing
Lifting/grading	Moderate	<ul style="list-style-type: none"> • Install hanging screens between individuals • Use turntable stations • Provide disinfectant at each station • Disinfect all equipment between shifts • Provide PPE when distancing is difficult • Slow equipment speed to accommodate lower staffing
First Aid	High	<ul style="list-style-type: none"> • Designate a first aid attendant • Wear PPE while treating • Conduct evaluations/treatments outdoors when possible



Figure 3. Social distancing outdoors at a bareroot nursery is relatively easy because beds are 6 ft (2 m) apart and there is ample space within a row. (Photo by Gina Sowders 2020)



Figure 4. Some nurseries have constructed barriers as part of conveyor lines to separate workers from one another. Individual sanitation bottles are often provided at each station for frequent sanitation. (Photos by Thomas Stevens and Sean Webb 2020)

from temporary to contract employees on the packing lines and other places throughout the nursery. The justification for contract employees was to have a consistent workforce and known individuals working at the facility. Some nurseries have brought in porta-potties and installed separate wash stations to minimize interactions among pods, contract crews, and other staff. Additionally, work schedules have been adjusted with staggered start times and break times. To accommodate changing schedules, seasonal activities, such as packing, may need to commence earlier and finish later. When vehicles are used at the nursery, some nurseries have established a policy of one person per vehicle.

Strategies to Limit Outside Contact During Shipping and Delivery

Nurseries now have strict limitations regarding who can enter the nursery site. The nurseries are closed to the public and do not allow any visitors. If outside people do come on site, interactions are kept to a minimum and sanitation practices are followed after they leave. Before the pandemic, one nursery kept their gates open all day during work hours but have since reprogrammed the gates so they are only open in the morning when the crew arrives and again at the end of the day when the crew departs. A sign is posted at the gate that an appointment is



Figure 5. Most nurseries have closed to the public by keeping gates closed and instructing any visitors that appointments are required. (Photos Thomas Stevens 2020)

**APPOINTMENT
REQUIRED**
24 hr notice
FOR ALL VISITORS
(NO WALK-INS)

**TEMPERATURE
SCREENING IN
PROGRESS**
#888-333-3333



Figure 7. Signs are posted throughout nursery facilities to remind employees to follow new protocols. (Photo by Sirlol Paquet 2020)



Figure 6. Screening people through questionnaires and temperature checks when arriving at the nursery are often done before they enter nursery facilities. (Photo by Thomas Stevens 2020)

required to enter the nursery (figure 5). Recurring vendors have been given the gate code but must be screened when they come into the facility.

Some nurseries require all outside people, such as contractors, vendors, and delivery drivers, to respond to a brief COVID-19 questionnaire and to have their temperature taken upon arrival (figure 6). One nursery sends the nursery COVID-19 policies via email to outside people before their arrival if possible, which is then signed upon arrival. To avoid interaction with nursery employees, delivery drivers are expected to call when they arrive, stay in their vehicle, and/or not enter any buildings. Nursery employees will load or unload the vehicle for them when possible. If there is a night pickup or delivery with no nursery staff present, drivers are required to spray anything that they touch with a sanitizing solution. Additionally, some nurseries require contractors and others to have their own COVID-19 policy so they know that the contractor has safe practices in place.



Figure 8. Outdoor areas are a great way to social distance employees during trainings and daily briefings. (Photo by Gina Sowders 2020)

Contingency Plans for Non-Conforming or COVID-19 Positive Employees

At the time of the webinar, none of the nurseries represented on the panel had had anyone at the nursery test positive for COVID-19. A few had been tested but all were negative. One nursery had someone who may have been in contact and sent that person home until their test results were available. An allied nursery did have a positive test and the subsequent contact tracing took out the whole staff. Nursery managers regularly remind their employees to be extremely careful with fellow employees, especially if they have any hint of symptoms.

Enforcing policies to wear masks, practice social distancing, and sanitize are needed constantly. Signs are posted liberally in work areas (figure 7). Managers frequently give reminders to keep distance; one even brought pool noodles to the nursery to help people understand exactly what a 6 ft (2 m) distance is. Management personnel also constantly remind each other to make sure they are setting the right example for the crew. It can be challenging. Some people complain that the mask is uncomfortable or say that they cannot hear what others are saying because of the mask.

When possible, management and crew meetings are held outside so people can take their masks off (figure 8). The new safety policies have slowly become a cultural practice to which people are getting accustomed. Employees are also expected to take precautions outside of work hours, although that cannot be enforced. One nursery provides all employees a washable cloth mask for use at work and outside of work.

For the most part, employees are taking the pandemic policies and practices seriously. Nurseries are aware, however, some people do not take it as seriously as others and pay extra attention to those individuals in the workplace. These people are reminded more frequently about distancing, PPE, and sanitation requirements and are kept a bit more separated from other employees if possible. At the time of the webinar, none of the nurseries had to do any disciplinary actions for noncompliance with the new health policies other than verbal warnings. One employee was told, “If you’re not part of the COVID team, then you should not be at work.” That statement was effective in changing the employee’s attitude. In general, the policy for most nurseries is to first give a verbal warning, then give a written warning, then send the employee home if they continue to not comply with safe practices.

If an employee is exposed to COVID-19, nurseries require that person to be tested before returning to work. Some nurseries require a 2-week quarantine following exposure; others do not require a quarantine if the test is negative. Contact tracing is done for those who are exposed to the virus or have tested positive. If there is a positive case at the nursery, the expectation would be that it is limited to a specific “pod” or “bubble,” so productivity is not entirely halted. Extra sanitation is carried out immediately upon an employee leaving work, prior to test results.

If several employees are unable to work because of illness or quarantine measures, some nurseries have trained inmate and fire crews to assist with nursery tasks. Contract crews are also an option, although visa issues are a major concern. This alternative help will not cover management activities, however, and productivity may decline.

Expected Impacts on Current and Future Production, Costs, and Sales

Implementing new safety protocols and potential interruptions in workforce numbers are expected to have an economic impact, although the extent of that is not yet known. All managers on the webinar panel emphasized that health and safety are the highest importance, but new practices will likely reduce productivity. The general approach is to be flexible, lower expectations, stay up-to-date with national and local guidance, and to maintain calm while navigating through this situation as carefully as possible.

Purchasing PPE and extra cleaning supplies is an added expense (figure 9). Labor expenses are also likely to increase. Nurseries plan to hire enough people to accommodate longer hours, staggered schedules, and weekend work to achieve production goals, while keeping people distant and/or separate. Some tasks will take more time than normal. For example, loading and unloading trucks takes longer. Also, keeping orders separate in the cooler at some nurseries could reduce available storage space. Another concern is potential weather effects on seedling quality and phenology as a result of extended (both early and late) sowing and lifting to accommodate modified work schedules or reduced workforce numbers. As a result of these expenses and concerns, some nurseries may have to increase



Figure 9. Nurseries use a variety of PPE supplies to keep employees safe. (Photo by Gina Sowders 2020)

their seedling prices next season. In mid-December 2020, the British Columbia provincial government announced the Forest Sector Safety Measures Fund Program, where small and medium-sized businesses, including forest nurseries, can apply for funds to help offset safety-related costs due to the COVID-19 pandemic. This program should help minimize increasing seedling prices from British Columbia nurseries.

On a positive note: nursery managers have noticed that some tasks now take less time because employees are not working next to each other and being distracted with conversation, a common occurrence before the pandemic that delayed completion of tasks. Another positive is that no one has been sick this year from other illnesses. Ordinarily, people would come to work with the flu and shortly thereafter, there would be several out sick. Also, there is an overall increased attention to cleaning.

Effects of the pandemic on future sales are unknown. Some nurseries expect sales to stay strong, while others are concerned about reduced demand. Logging and tree-planting activities have also had to modify standard operating procedures and have experienced cutbacks and delays. Still, increased demand for wood for home renovation projects and single-family home construction, plus demand for post-wildfire restoration, are increasing seedling demands in western regions.

Conclusion

The tree seedling nurseries who participated in this panel discussion had many similarities in their approach to maintaining productivity during the COVID-19 pandemic, which is likely similar at most nurseries across North America. All are taking the pandemic seriously over fears of complete shut-down or loss of productivity, and so far, none have experienced COVID-19 spreading among workers. This does not mean they have let their guard down. Quite the opposite; most nurseries have ramped up safety precautions using the best guidance from Federal, State, and Provincial governments and are learning new ways to keep their operations functioning. Demand for seedlings was near an all-time high in 2020, which is expected to continue despite some temporary reduction. The herculean effort nurseries put into growing, packing, storing, and shipping seedlings while protecting workers during the pandemic should be commended. The short-term setbacks from loss of productivity and extra costs associated with PPE and sanitation supplies and changes to workforce structure will hopefully result in changes to the nursery industry that will enhance resiliency into the future.

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