WSU Puyallup
WSDA Christmas Tree Advisory Committee Update
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Key Support staff:

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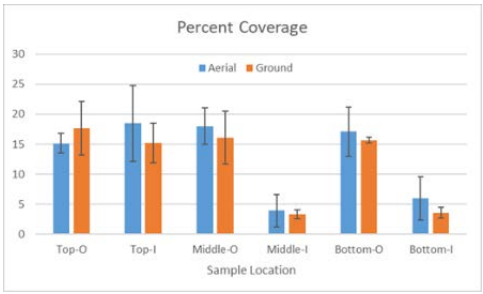
Below is a short summary of a few Christmas tree research activities at WSU Puyallup:

- **Douglas-fir twig weevil** - Work on Douglas-fir twig weevil emergence relating to growing degree days and the efficacy of insecticides was completed. During this project, water sensitive spray cards were used to compare the coverage of sprays that were applied by a helicopter and ground-based sprayer. Application method had very little effect on coverage in this trial. However, the coverage was much higher on cards that were placed along the edges of trees compared to the cards that were placed about 3 inches in from the edge. An article about this project will be submitted for inclusion in the upcoming issue of the Lookout.



- **Efficacy of Bluefume (HCN) fumigation in eradicating elongate hemlock scale on Christmas trees**: The elongate hemlock scale (EHS) is an exotic, armored scale insect pest of Christmas trees and other conifers. This pest has become a key pest of true firs grown as Christmas trees during the past 30 years in eastern north America. Although it is not known to occur in the western U. S., it was recently detected on Fraser fir Christmas trees and evergreen products that were shipped from North Carolina to a number of western states, including WA. In collaboration with scientists at NCSU and USDA-ARS, the goal of this project is to evaluate the effectiveness of Bluefume fumigation in killing EHS life stages on infested Fraser fir and examine the tolerance of several commonly grown Christmas tree species to this fumigant.

- **Establishment of CoFirGE2 plots** – The recently completed 2013 CoFirGE plots identified families of Turkish and Trojan firs that have the potential to produce high quality Christmas trees with excellent needle retention when grown in the PNW. This spring, a series of plots were established in Christmas tree production regions across the United States, including in WA, OR, ID, and CA to obtain additional data on the top 12 performing Trojan fir families in the original 2013 CoFirGE trial. These plots also contain selected families of Turkish, Nordmann, balsam, Canaan, Fraser, and noble firs. Data on the first-year survival and growth of seedlings will be collected this fall.

- **Fertilization of seedlings at the time of planting** – To obtain information on the potential benefits of fertilization of seedlings at the time of planting, a single Simplot BEST PAKS® biodegradable planter packet containing a 20-10-5 controlled-release was placed in the bottom of half of the planting holes at the time of planting the above CoFirGE2 plot at WSU Puyallup. The effect of the fertilizer on color, growth, and bud set of the Trojan, Turkish, Nordmann, balsam, Canaan, Fraser, and noble firs in this trial will be assessed this fall.
- **Susceptibility of Trojan fir to Phytophthora root rot** - Two 4-month-long greenhouse trials were established to determine the susceptibility of the Trojan fir families in the CoFirGE2 trials to the four most common species of Phytophthora that are found in Christmas tree plantation across the United States. These trials involve 9,200 seedlings and are being conducted under "moderate" and "warm" temperatures to determine the effect environmental conditions have on the levels of host tolerance to Phytophthora root rot.

- **Susceptibility of Trojan fir to Phytophthora root rot** – The development of Phytophthora root rot (PRR) is favored by periods of saturated soil that allows for swimming zoospores produced by the pathogen to spread and infect susceptible root tissues. To obtain information on the susceptibility of the Trojan fir and other conifers included in the CoFirGE2 plots, seedlings were planted in soil that is infested with the same Phytophthoras that are being used in the greenhouse trails. Berms were then constructed and these "rice paddies" have then been periodically flooded to create conditions favorable for the development of PRR. Data will be collected on disease development on all the seedlings in these paddies over the next two years.

- **Mortality of Christmas trees** - During 2022, extensive mortality of noble and Fraser fir trees occurred in the PNW. Root diseases, such as Phytophthora, Annosus, and Armillaria root rots, can kill trees and limit where noble and Fraser fir Christmas trees can be grown. Weather patterns associated with climate change have the potential to increase the occurrence and severity of these diseases. For example, following the heat dome in June 2021, western Washington and Oregon received record levels of precipitation from mid-September to early December. This was followed by a protracted period of cool, wet weather during spring 2022, and record hot, dry conditions again during the 2022 growing season. Increased precipitation can create conditions that favor the development of Phytophthora root rot, while higher temperatures and drought stress may predispose trees to Armillaria root disease. In addition, higher soil temperatures can favor a shift in the population of Phytophthoras to more aggressive, warm-weather species like *P. cinnamomi* in regions such as the PNW. Limited sampling done last year suggest that trees at some sites were potentially be killed by Armillaria root, which produces characteristic white mycelial fans beneath the bark. Phytophthora cinnamomic, which is seldom been found on Christmas trees in the PNW was also picked up in two sites. Because of the scope of mortality, the multi-age classes of trees affected, and the results of preliminary sampling last year, the Real Tree Promotion Board is supporting additional survey work in 2023-24 to better understanding of what diseases are associated with the increased

mortality and what role climate change may have on their development. An article on this project was published in the 2023 fall issue of the Lookout (Pages 18-20).

Collaborators:

- Chal Landgren and Judy Kowalski, Oregon State University
- Bert Cregg, Michigan State University
- Robert Jetton and Justin Whitehall, North Carolina State University
- Spencer Walse and Stephen Corbett, USDA ARS, Commodity Protection and Quality Research Program, Parlier, CA

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- Jim Rockis – Data analysis

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