

Observations on the Conditions, Pests, and Diseases on Older Eurasian Firs in WSU Puyallup Research Trials

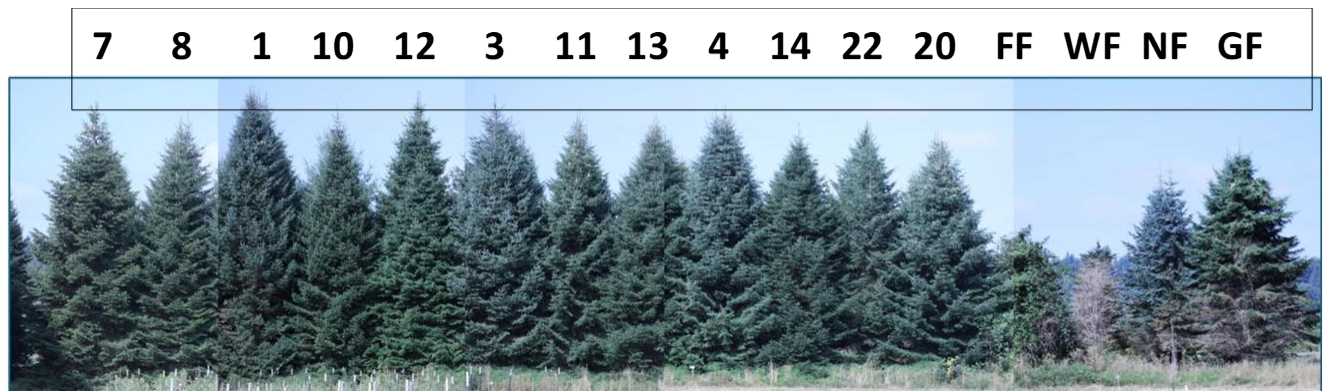
Gary Chastagner and Chal Landgren

During the past 20 years, a number of trials have been conducted with Eurasian firs at WSU Puyallup. Three plantings of Nordmann and Turkish fir were established at WSU Puyallup in 2004. These include two genetic plots that were part of a series of PNW region wide progeny/provenance test plots that were established in collaboration with Chal Landgren at Oregon State University. The goal was to evaluate the potential of trees from 15 promising sources of Nordmann fir and four sources of Turkish fir that were identified following the completion of a 3-year-long WSU collaborative trial with Ulrik Nielson, who was the Christmas tree geneticist at the University of Copenhagen to examine the genetic variability in needle loss in Nordmann fir. At the time of establishment, trees were planted on a 6' X 6' spacing. Five trees of each source were planted in adjacent rows in each of five blocks and Fraser fir was included in each block as a reference species. During the following eight years growth, disease, pest, needle loss, and quality data were collected on each of the trees in the plot. One of the plots is largely still intact and data are being collected on the propensity of the trees to produce cones.

The third plot is a demonstration planting (TF104) containing 14 Nordmann fir and three Turkish fir sources that were also in the two genetic plots, along with single sources of Balsam, Canaan, European Silver, Grand, Fraser, Korean, Nikko, Noble, Shasta, and White firs was established at WSU Puyallup. Trees were planted 6 feet apart in rows that were 12 feet apart. Ten trees were planted from each of the sources of Turkish and Nordmann firs, and five trees were planted from each of the other species. Over the years trees in this planting have been used for several purposes, including various outreach activities.

The condition of the trees along the eastern edge of the TF104 planting have provided a glimpse into the variation in growth characteristics of the Nordmann and Turkish fir trees in the planting. Unlike the Nordmann and Turkish firs that have very few insect and disease problems, the Fraser fir trees have been killed by balsam wooly adelgids, and the white firs have been killed by *Grovesiella* canker. White fir supports high levels of pathogen sporulation, which has resulted in the spread of this disease to noble and grand firs that are adjacent to the white firs.

Turkish and Nordmann firs along edge of TF104 planting	
Code	Species (Source)
7	Nordmann fir (Aabenraa, Saltbjerg)
8	Nordmann fir (DK Nordjylland, Tversted)
1	Turkish fir (Bursia/Komursu)
10	Nordmann fir (DK Berritzgaard, Hildesvig)
12	Nordmann fir (DK Randbol 053/00)
3	Turkish fir (Adapazan/Hendek)
11	Nordmann fir (DK Randbol, Ussinggard Sonderskov)
13	Nordmann fir (DK Vallo #1)
4	Turkish fir (Adapazan/Akyazi)
14	Nordmann fir (DK Vallo #7)
22	Nordmann fir (DK Koberhavn 076/00)
20	Nordmann fir (DK Vallo #9)
FF	Fraser fir - Killed by Balsam Woolly Adelgid
WF	White fir – Killed by Grovesiella canker
NF	Noble fir – Damaged by Grovesiella canker
GF	Grand fir – Damaged by Grovesiella canker



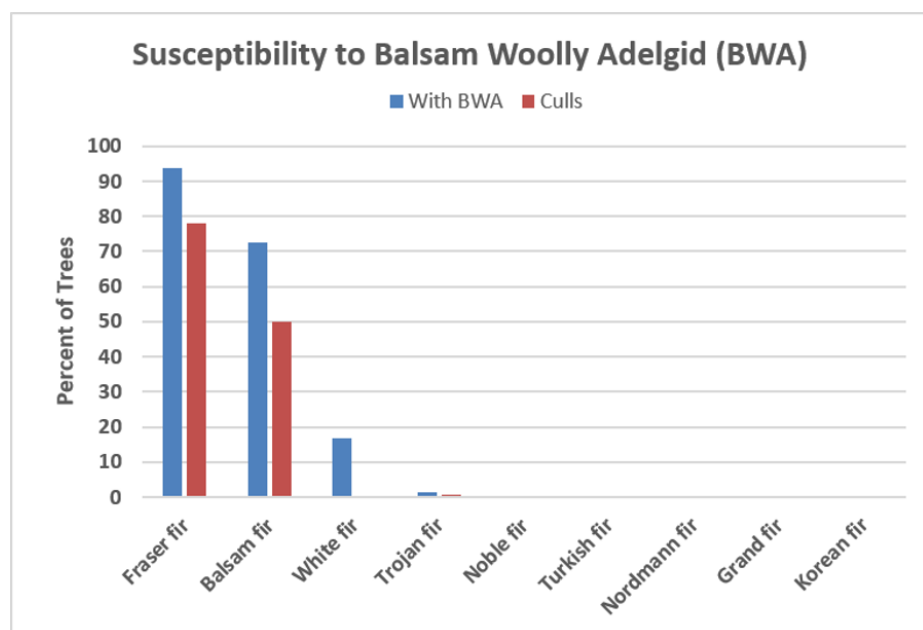
With the help of Jason Stajduhar from Bear Canyon Tree Farm, a drone was used to obtain aerial images of the trees in the remaining genetic plot (NT104) and the TF104 planting last year. In addition to showing which trees were coning, the images clearly show the mortality that has occurred due to *Grovesiella* canker and balsam wooly adelgid throughout these plantings. No fungicides or insecticides have been applied to the trees in either of these plots. *Grovesiella* has killed all the white firs and most of the Shasta firs in the TF104

planting and Balsam woolly adelgid has killed all the Fraser firs in both plots and most of the Canaan firs in the TF104 planting.

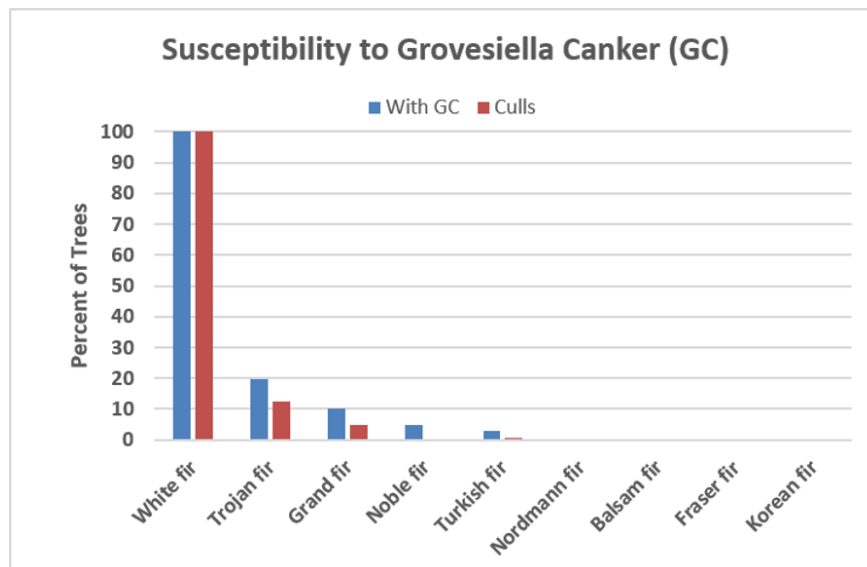


In 2024 data were collected on the development of balsam woolly adelgid, *Grovesiella* canker, and interior needle blight (INB) on Nordmann, Turkish, Trojan, balsam, grand, Fraser, Korean, and white fir trees that were still present in the Nisqually CoFirGE-1 trial that was established in 2013. No fungicides or insecticides had been applied to the trees, so it was possible to obtain an idea about the susceptibility of the hosts to these diseases and pest. Data on the percentage of trees affected and the severity of damage was assessed by estimating the percentage of infested trees and percentage of affected trees that would be culls.

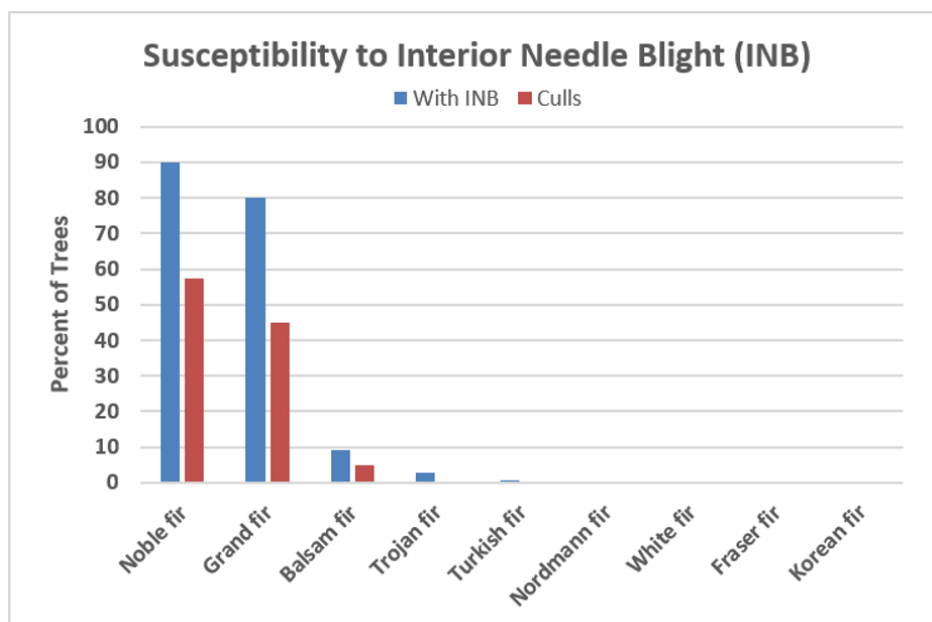
Fraser and balsam firs were severely damaged by balsam woolly adelgid. Except for a limited percentage of infested white and Trojan fir, BWA damage was not observed on the other hosts.



Like in the TF104 plot, most of the white firs were killed by *Grovesiella* canker. While a small percentage of the Trojan, grand, noble, and Turkish firs exhibited branch flagging due to canker, this disease was not observed on the other hosts.



Noble and grand fir are highly susceptible to INB and about 40% to 50% of these trees were unmarketable. Very little INB was detected on the other trees.



The continued monitoring of trees in these older trials provides an opportunity to gain insights into the susceptibility of Eurasian firs to common pests and diseases that affect Christmas trees in the PNW.