Noble Fir Site
Seedling and Genetic Interaction

by Ken Brown

A discussion at the Genetic Research Committee meeting at the Tree Fair this past September prompted me to write this article. The meeting topic was noble fir Christmas tree genetic improvement.

Chal Landgren, OSU Extension, reported the results of the latest progeny test, which will be published elsewhere in this issue of the Christmas Tree Lookout. The discussion was on two factors in addition to genetics that play a big part in the success of a noble fir Christmas tree planting: the site where seedlings are planted and the seedlings themselves.

The PNWCTA genetic improvement program is aimed at improving production efficiency. There are obvious cultural practices that are necessary and for this article we will assume they are up to par. This allows us to concentrate on site, the seedlings and genetic improvement. The object is to maximize production efficiency and, hopefully, profit (supply and demand has an overriding effect on profit). This article is designed to put site, seedlings and genetics into perspective.

Most, if not all, people reading this will understand how important site is to growth and quality of noble fir Christmas trees. The species does best in western Oregon and Washington with a relatively cool climate with adequate, but not excessive, soil moisture. Soils need to be well drained to accommodate our excess winter rain but deep enough so stored soil moisture can carry trees over our typically dry summers.

The original noble fir progeny test (Fall 1987 Lookout) shows a dramatic example of the importance of site. This test covered a complete range of sites where noble fir can be grown successfully. The difference in tree value, independent of genetics, was dramatic. The best site produced trees worth an average of $2.73 per tree more than the average site. This includes all of the progeny so would be equivalent to woods run seed from that Riley/Fanno (R/F) area.

The encouraging factor was that trees with better genetics were better on poor as well as good sites. It is virtually impossible to compare genetically improved seed sources unless they are on the same site. The seedling effect is more complicated.

Physiology is a term that deals with the basic health of a plant. For noble fir seedlings it includes things like dormancy, stored plant food, mineral nutrient levels, etc. Minimizing stress from moisture deficiency, handling and storage and planting are also a part of a healthy physiological condition.

Morphology of seedlings is also important. This term refers to the shape of the top, the roots and the ratio of top to root mass. From a practical standpoint it's the combination of physiology/morphology (p/m) that is important.

The term "seedling quality" will be used to cover all of these factors. This needs to be put into perspective in relation to genetic improvement. There have been numerous situations where I have observed effects of seedling quality on noble fir but I want to mention two of them.

The first goes back to my early work with Christmas trees. Barney Douglass pointed out a distinct difference in mature Christmas trees on the same site. These trees were grown from the same seed lot but at different nurseries. We did not know what the difference was but it had to be the quality of the seedlings, not site or genetics. That lesson stuck with me and this year I observed another example of the importance of p/m.

This was from the noble fir progeny test plot on Jan Hupp's farm. The trees outside the plot looked better than the best progeny in the plot. Both groups of trees were the same age including nursery age. The test trees were plugs, grown at a BLM nursery that had problems. The trees were carried over an extra year in a relatively small plug and planted in the spring. The trees around the plot were 2-0 bare root seedling from Drakes Crossing Nursery.

The seed source was woods run 053 or 251 seed zone in the Oregon Coast Range, the same general area as the R/F sources. Both groups of seedlings had the same number of growing seasons but the seedlings outside the plot were fall planted.

The best progeny in the plot was a six by ten cross. A selection 11-3 from the BLM seed orchard was next. R/F 10 was third and R/F 15 rated seventh out of 16 sources. Both 10 and 15 were from seed collected from the mother trees in the woods.

Prior to harvest I went back and made a comparison between these better progeny in the plot and the woods run source. The plot was set up with ten
trees replicated six times so I selected the same number of ten tree
replications outside the plot area.

It was obvious the trees outside the
plot were better Christmas trees. The
top six R/F mother trees have been
tested several times and have always
had outstanding performance.

There is a remote possibility that the
seed source outside the plot came from
a genetically better stand. Our genetic
work has always shown the R/F stand is
as good as or better genetically than
other stands in that seed zone. This
leaves seedling quality as the logical
explanation for the good performance
of the trees outside the plot and this is an
important concept.

My experience with genetically
improved noble fir seed is that it comes
in third after site and seedling quality for
efficient production. The key to
generically improved seed is that it
improves efficiency over both site and
seedling quality variables.

There is a lot of experimenting going
on with types of planting stock, both by
nursery people and Christmas tree
growers. Growers can choose between
large container stock at $1.00 per tree to
the inexpensive 2-0 bare root stock for as
little as $.20 per tree. There are dozens of
variations in between.

It is not logical to get into a
discussion on merits of the different
stock types but I do want to get growers
thinking about the effect planting stock
has on harvest age of trees.

In summary, the key factors for
efficient noble fir Christmas tree
production are site, seedling quality and
seedling genetic capability, in that order.
The encouraging thing about our
genetics improvement program is that it
improves efficiency on any site where
noble fir can be grown successfully.
Genetic improvement will have a
positive effect over a range of seedling
quality conditions that allows increased
productivity.

About the author: Ken Brown is an
active member of the PNWCTA Research
Committee and manages the PNWCTA
seed orchards.

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