

# Grafting Fraser Fir: Looking for the Fall Grafting Window

by Douglas Hundley, Avery County IPM Program Technician

Since the beginning of Fraser fir production in western North Carolina, *Phytophthora* root rot (PRR) has been a constant problem. Despite years of preventative management, this disease has been established in both small and large pockets in all Fraser fir growing counties. Unfortunately, fungicides have not proven to be an economical control method under field conditions. When a portion of a field is lost to *Phytophthora*, it is virtually lost to Fraser fir production. There is potential and interest now in reclaiming these infested areas by planting other species of fir as disease tolerant rootstock and grafting Fraser fir onto them. To date, Turkish fir (*Abies bournmuelleriana*), and Canaan fir (*Abies balsamea* var. *phanerolepis*) have been used as the rootstock. However, some important concerns remain.



Fraser bud grafted onto Turkish

First and foremost is that, while grafting can be done easily with a high percentage of success from February through April, this is not a good time of the year to add yet another task to a busy Christmas tree farm. The spring months are already filled with many other activities including planting, fertilizing, and insect and weed management.

The second question is do we have the best resistant rootstock available for *Phytophthora* tolerance? One fir species, Momi fir, (*Abies firma*), needs to be further studied. Momi fir has been ranked as the most resistant in four independent greenhouse studies.

With the first question in mind, a small number of Turkish fir rootstock (3-0) was grafted with Fraser fir scion on August 20th and September 20th in 2004. These grafts were made in the field. Surprisingly, the August grafts healed or mended during the fall months at a success rate of 90% and developed healthy growth during the spring of 2005. The grafts made in September had only a 33% success rate.

Due to the encouraging results from this August grafting, plans were put into place to proceed with larger trials in July through September 2005. Coincidentally, Momi fir was acquired this spring with the help of Avery County grower Waightstill Avery.

As a result Turkish fir, Canaan fir, and Momi fir were planted in spring 2005 across Avery County by at least 15 growers with the expressed purpose of using them for grafting root stock beginning in July 2005. Plans were to graft Fraser fir on a weekly basis from July 15<sup>th</sup> through September 15<sup>th</sup> onto Turkish, Momi, and Canaan fir rootstock. This was done on various farms, with multiple rootstock and under varying conditions.

We began at random, based on grower opportunity, to field graft in mid-July. The growers participated in all the grafting. We grafted on to whatever type and size exotic fir they had. We used exclusively Fraser fir terminal leader scions taken from field trees ranging from 3-6 foot. We grafted at 15 different locations but returned to the same sites at different times. Between July 16<sup>th</sup> and September 30<sup>th</sup> we grafted on 26 different days. In addition, several days of grafting were conducted by the growers without assistance.



Fraser onto Turkish root stock

Of course you know what the weather was like this summer with unusually hot temperatures throughout the period. Rainfall ran well above normal preceding the planting and throughout the spring and summer in Avery County. Then in September and October we had a mini-drought.

When working with the newly planted seedlings we chose to graft only onto plants that had the necessary branching characteristics and appeared to be healthy enough. We left about one third of the newly planted seedlings not grafted this year. We hope to work with these seedlings during next year's project.



This graft was made in August 2004 and is growing well the next summer

The growers and I began looking at the grafts on their farms about October 1<sup>st</sup>, making sure 8-10 weeks had passed since the grafting was done. In just that short period of time the results become clear though final results will not be complete until the new growth of the grafted seedlings breaks bud and elongates next summer. However, it appears that August was not a good time for grafting in 2005 even though it was in 2004. This year, the September grafted seedlings looked far more successful.

What made September seem to be the best month this year? In 2004 it was August, not September, that produced better results. A look at the weather patterns of the two years might help explain it. Personal observation is simple. In most years the heat of summer (July) breaks in August. Usually a cool front comes through and daytime highs will change from the low 80's to the 60's. Also nighttime lows may change from about 55 – 60°F in July to 40 – 50°F in August. 2004 was typical in this way. 2005 was not. Hot humid days continued in August of this year. That first break from the heat occurred the first week of September.



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would perform when challenged with Phytophthora. In fact, many of the growers planted the Momi in wet areas to give them the greatest challenge. Many were planted in areas no grower would ever try to grow Fraser fir in. It probably ended up being too wet. The Momi fir that were planted in exceptionally wet areas were yellow and stunted but generally didn't die. Close examination of the roots on these trees revealed dead root ends, but it just didn't look like typical PRR; in fact, Dr. Kelly Ivors analyzed some of these dead roots and was unable to isolate Phytophthora. However, these stunted plants did not produce very many successful grafts.

Unfortunately, this year with the great disease pressure we also got a partial answer to our second question. Many of the Fraser fir that had been grafted onto Turkish and Canaan fir have died from Phytophthora this year. Therefore Momi continues to be our greatest hope of success.

Momi by itself would not make a good Christmas tree in western North Carolina or in fact anywhere else. It has stiff, prickly needles and is just frankly not that pretty. Also it breaks bud so early that the new growth is often frozen off in this area.

Grafting of Fraser fir onto more resistant rootstock will continue into 2006. Hopefully we will learn how well Momi fir as a rootstock will perform in areas where Frasers can no longer grow due to PRR. In 2006 we will also be testing our theories about grafting in the fall when it finally cools off. This work is expanding into other counties as more and more growers are trying to offset their losses of land to this terrible disease. In the future this may be one of the tools growers can use to reclaim areas lost due to Phytophthora. 

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