

Carolinas Chapter 2008 Activities Report October 2008

Membership

The chapter has 480 total members, 380 of whom are residents of North Carolina, 93 from South Carolina, and 7 from several other states.

Orchards

The chapter has 28 orchards or farm plantings ranging from just south of the Virginia border in North Carolina to just north of the Georgia border in both North and South Carolina. Two of these orchards are new this year. About a third of the total of our orchards are known to have infestations of *Phytophthora cinnamomi* (confirmed by Steve Jeffers of Clemson University). The plantings in several orchards have been completely killed by the *Phytophthora* pathogen, but the news is not all bad: chestnuts screened for *Phytophthora* resistance have been planted in the *Phytophthora*-contaminated fields of Joe James' farm for more than four years now with good survival rates.

The chapter has now achieved its goal of establishing orchards growing chestnuts that represent at least 20 lines of local American parents with Clapper derived resistance. Our orchards sites are found on individual landholdings, commercial and industrial properties, educational institutions, and local and state public lands. We are indebted to all of our cooperators, and to Paul Sisco for organizing and managing this complex operation.

We have begun the process of developing lines of what we've been calling "low-elevation" chestnuts. This is to distinguish lines of chestnuts with American parents from the Piedmont and coastal regions from those lines with higher elevation, mountain parents. These lines will have blight-resistance from the Graves source. We now have hybrid (B2 and B3) seeds in these lines from five American parents. Perhaps more importantly, we will screen these lines to determine if they can be used to develop *Phytophthora* resistance for survival across the large *Phytophthora* contaminated regions outside the Appalachians.

Harvest – Blue Ridge Parkway and Father Tree Program

The chapter harvested almost 2000 open pollinated American chestnuts from the Blue Ridge Parkway. Some of those nuts were retained by the chapter to be used in continuations of the *Phytophthora* experiments discussed in the Research section of this document. Two dozen were given the University of North Carolina at Wilmington to be used in an archaeological chemistry study.

The remainder was delivered to Greg Miller of the Ohio chapter to be distributed to other research groups, and as seed kits by the American Chestnut Foundation.

The chapter hand-pollinated father trees at Meadowview with pollen from six sources, four of which were from low-elevation sources, and two of which were Joe James' Phytophthora-screened sources. We harvested nearly 600 nuts from these controlled pollinations this fall.

Research

1. Phytophthora

Joe James's work in *Phytophthora cinnamomi* is now becoming well known in the national organization and internationally. This program has been ongoing for the past four years. Thus far it offers hope that the current pool of hybrid chestnuts demonstrates some diluted resistance to *Phytophthora*. Approximately 25% of the families tested show some level of *Phytophthora* resistance. However, only 2.5% of all seedlings planted appear to be able to survive long term in the presence of *Phytophthora*. By using these surviving seedlings, we hope to be able to create a gene pool where F2 and F3 generations can be produced that exhibit even greater levels of resistance. We have thus far screened 98 families (lines) of hybrid chestnuts and hope to complete screening of the remaining existing lines in 2008.

This year, we are testing Nanking BC1 progeny, which should show the segregation of genes for resistance and give us some insight into the genetic pattern of resistance inheritance. Preliminary data shows about 1/2 dead, 1/3 dead stunted and alive, and the other 1/6 doing well. The strongest survivors of this BC1 test will be placed in their own separate orchard and allowed to mature. These trees can be further back-crossed to begin additional lines resistant to both blight and *Phytophthora*.

Steve Barilovits conducted an experiment on the efficacy of several commercially available phosphite based products on enhancing the survival of American chestnuts in *Phytophthora* contaminated soils. These phosphite products are currently used in the control of fungi and *Phytophthoras* on turf grasses and fruit crops. The experiment used about 300 American chestnut seeds provided by the Pennsylvania chapter. The resulting seedlings were grown to about 1' tall and then inoculated with *Phytophthora*. The seedlings were separated into four groups: a control group that was not treated with any phosphates, and three other groups, each treated with Aliette (aluminum phosphite), AgriFos (potassium phosphite), or Prudent-44 (urea phosphite). Early results are that the untreated group suffered a 98% death rate; the Aliette group an 80% death rate; and the AgriFos and Prudent-44 groups a 25 – 30 % death rate.

Burt Abbot of the Genetics Department at Clemson University is continuing to develop genetic maps from seedlings in the Phytophthora experiments at Chestnut Return farm. The goal is develop a set of genetic markers that can be used to distinguish between susceptible and resistant seedlings. When this pattern is overlaid with previous genetic maps obtained by John Frampton of NC State University, inferences can be made as to the location of resistance genes.

2. Rooting Leaf Cuttings

In 2007, we gathered leaf and stem samples from root sprouts and large longer-term surviving chestnuts across our two states for use in a rooting experiment undertaken by Bob Head of Seneca, SC. Bob prepared over 120 cuttings from our samples, and used them in a matrix experiment of rooting hormones and inorganic salts known to encourage root growth in oaks. The cuttings were placed into small pots with controlled rooting solutions, and grown in a commercial rooting nursery. Many of the cuttings developed calluses on the stem (a precursor for root generation), and by the end of the summer, four samples from two groups of clones had developed roots. As far as we know, this is the first time that American chestnuts have been successfully rooted from cuttings. However, these seedlings were lost in January of 2008 due to a nursery error that took the seedlings from their climate-controlled greenhouse and placed them outside.

An important observation from this experiment is that a number of cuttings died from wet-rot, and that better results might have been obtained if the cuttings had been raised in a humidity-controlled greenhouse, rather than one with a fixed sequence-misting schedule. We think that our results, coupled with related work from the University of Guelph and others, strongly indicate that the American Chestnut Foundation should continue this line of research.