# Disease Resistance and Cold Tolerance Restoration Test Plantings in Maine

**Background:** The Maine chapter is about five years away from producing significant amounts of potentially blight resistant B3F3 seed that incorporates Maine native sources. There is uncertainty how well adapted this material will be to cold Maine winters as there is evidence of a tradeoff between blight resistance from Chinese sources and their vulnerability to winter shoot injury (Saielli *et al.* 2014). These early trials will provide data on blight resistance and cold adaptation which will be informative for a reintroduction program in Maine and other northern breeding zones.

**Research question:** How do *Castanea dentata* seed sources from contrasting temperature zones and levels of blight resistance perform in forested settings in Maine?

**Approach:** Select seed sources from populations across contrasting temperature zones (warm vs. cold) and levels of resistance (native, Chinese, B3F2, B3F3) and test their performance in mixed-family block plantings under operational field conditions on two locations in Maine (table 1).

**Experimental Design:** 2 x 3 incomplete factorial randomized complete mixed-family block design, replicated across two locations. A total of 6 combinations of provenance and improvement for disease resistance will be planted on an 8' x 8' spacing in 36 tree mixed-family plots (~5 sources within each family plot), randomized in three replicate blocks within each location. The total area needed for each site is a little over an acre, including a single border row of Maine B3F2's surrounding each location (figure 1.).

**Figure 1. Schematic Layout for a Single Location:**

| Block 1 | |
|---|---|
| Chinese | ME - native |
| VA – B3F2 | VA – B3F3 |
| VA - native | ME – B3F2 |

| Block 2 | |
|---|---|
| ME – B3F2 | VA - native |
| ME - native | VA – B3F2 |
| VA – B3F3 | Chinese |

| Block 3 | |
|---|---|
| VA – B3F3 | ME - native |
| VA – B3F2 | Chinese |
| VA - native | ME – B3F2 |

Note: each cell represents a plot of 36 trees from between 4 to 6 sources in an intimate mixture (6 trees x 6 trees). The identities of each tree is maintained in the field so that within source of variation could be quantified.

**Experimental Locations:**
One location was planted on May 2nd and 3rd, 2015 on SWOAM property in a recently harvested shelterwood in Vienna, ME (44.5325,-70.0141) and the other was planted on April 26th, 2015 in an old field on NEFF property in Knox, ME (44.5202,-69.2708). Seeds were directly sown in a 5" hole filled with potting mix, with a 12" aluminum flashing cone for protection. Deer fencing will be considered. Competing understory hardwoods and stump sprouts were sprayed with 20% Garlon 4A and 80% bark oil prior to planting.

**References:**
Saielli,T.M., P.G. Schaberg, G.J. Hawley, J.M. Halman, and K.M. Gurney. 2014. Genetics and silvicultural treatments influence the growth and shoot winter injury of American chestnut in Vermont. Forest Science. 60(6):1068 –1076.