

# Current State of Elm Research at TRE Nursery

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## Background

For much of the past century, American elms have been a very important part of our urban forest, especially in the Twin Cities. Since the outbreak of Dutch Elm Disease (DED), however, urban foresters and nursery growers have been scrambling to find suitable replacements for these tough specimens. The Minneapolis Park and Recreation Board (MPRB) has been planting many resistant elm varieties for years. Their interest helped establish a cooperative research project between the MPRB and the University of Minnesota's Teaching, Research, and Extension (TRE) Nursery to evaluate the various elms available in the nursery trade. The goal was to find as many new elm selections as possible and get a feel for their suitability in the Twin Cities Metro Area. Since 1999, over 900 elms selected from over 20 different varieties have been evaluated.

## Pruning & Maintenance

If you grow and maintain elms, especially Americans, you already appreciate how much maintenance is required to keep these trees in top form. Elms require unique levels of maintenance for long-term health, and many varieties will require pruning and training throughout the growing season for the first few years of their life outside of the nursery or garden center. Maintenance of strong central leaders is of critical importance, especially for boulevard trees. Inspired by the pruning research performed at the University of Florida, Gainesville by Dr. Ed Gilman, we examined different production techniques to produce elms that were both manageable in the nursery and had a form required for long-term structural health.

Cathedral elm is an *Ulmus japonica* variety that has been around for many years (Figure 1 planted in 1975) which has a high incidence for breakage due to poor branch attachment and included bark. We felt this would be an excellent selection for this type of research. One treatment involved planting young trees into the production field on fairly close spacing, about 7 feet on center and 12 feet between rows. These trees were staked only to keep them upright long enough to root in. No other pruning or training was performed. The other treatment maintained wider spacing, 10 feet between trees and 12 feet between rows. These trees

were managed like most nursery stock, pruning, raising and thinning to balance crown and stem with heading back cuts to allow staking and splinting of central leaders. These trees were grown for three years and harvested B&B in the 3 to 3.5" stem caliper range.

The trees grown under close spacing, while much less uniform in height and form had both greater caliper increase and greater apical dominance. The trees grown under higher maintenance conditions, while more uniform, lost apical dominance at a much lower height. This research is still only preliminary, and should not be taken as hard fact, as these results are based only with one type of tree under two types of maintenance systems. Interestingly enough, though, with some of these elms less may be more!


The recent publication of Dr. Ed Gilman's recent pruning study (The Journal of Environmental Horticulture 24(4)) inspired additional research, this time taking a look at how pruning practices affect stem caliper increase, pruning wound closure, and overall tree health. This new study at TRE includes three different species fairly common in Minnesota: New Horizon elm, Homestead elm, and common hackberry (*Celtis occidentalis*). We hope to have solid results by 2009.

## American Elms

Work at TRE is now focusing on true *U. americana* selections. The 'American Liberty' elm is a patented selection currently propagated only by the Elm Research Institute (ERI) in New Hampshire. This tree is a "multi-clone" selection which means that there are actually six different genetically unique clones that are sold under the 'American Liberty' name. Unfortunately, this also means that they behave differently in the nursery, and it's a little difficult to get a uniform crop. We have a few dozen liners under evaluation at the TRE Nursery and after three or four years more will be known about this selection's suitability for the Twin Cities area. This tree may be too cost prohibitive to purchase for liner

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163 Yard Par 3 eighth hole at the Refuge Golf Club in Oak Grove, Minnesota.



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## Elm Research-

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production at a production nursery (\$35 for a two year rooted cutting). And, unless ERI changes its licensing policy to allow others to propagate it, this one probably won't become a big name in the trade.

The U.S. National Arboretum recently donated fifty 'Jefferson' clones from their production to the TRE Nursery. The parent tree is reported to have excellent DED resistance and superior form, we'll know more in three to four years. This selection has been quite easy to root from softwood and semi-hardwood cuttings, and, is not patented like both 'Valley Forge' and 'Princeton', making it a good one for growers to keep their eyes and budding knives on.

Finally, research is continuing on three local U. americana selections that show favorable signs for DED resistance. Research is just entering the third year and it will take at least two to three more before we have a good grasp of how resistant these trees are, if at all, to DED. If any of these trees are found to have

high levels of resistance, a release to the trade will take considerably longer. We are also continuing work to examine trade-viable budding and grafting techniques for these and other American elms using seedling and DED-resistant clonal rootstocks. The current practice of rooted cutting production in most U. americana varieties may not be conducive to high consumer demand for uniform stock with shorter production times. More concern lies in rootstock selection as most U. americana selections are probably not compatible or appropriate to use with the U. pumila rootstocks commonly used for budding the hybrid elms currently in the nursery trade.

### Looking Long-Term

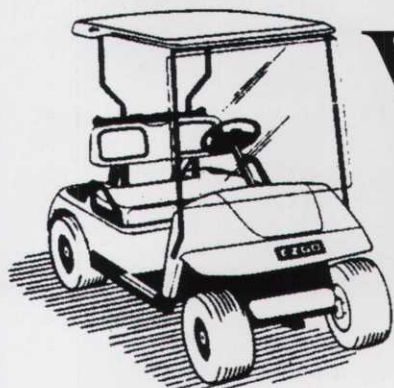
Finally, you may ask how much information can be gathered simply by measuring and observing a tree in the TRE Nursery for only three or four years. Fortunately, we've been asking that same question as well, and have started long-term evaluations of these trees in the City of Minneapolis. We are now able to track a tree from the moment it is planted at the TRE Nursery to its final planting site in Minneapolis. Evaluations are based on a

modified "condition rating" system which examines the overall health of the tree by rating stem and crown condition. The first round of ratings included a wide selection of elms in North Minneapolis along Olson Memorial Highway. This location is very representative of tough, urban conditions where these trees will be most useful. The big winner here is Danada Charm™; this tree looks simply outstanding in all cases so far, with a nicely balanced form and excellent hardiness and growth rate.

Tied for second place are Cathedral, Triumph™, and Patriot which are performing very nicely as well. Some surprises include Pioneer, which we touted as being a great selection at the TRE Nursery. In the city, however, it would appear that winter hardiness, perhaps combined with other factors, has taken its toll on these trees. Almost all had fairly significant tip die back and branch loss over multiple years among other indications of poor winter hardiness. We shouldn't be too hard on this one, though, it was released as a Zone 5 tree! Both Discovery and Vanguard were a little rough as well, mostly due to poor crown balance and branch structure.



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