

## Research Note

# COMPARATIVE TEST OF SIX DED-TOLERANT ELMS: A PRELIMINARY REPORT ON NURSERY PERFORMANCE

by John Kuser<sup>1</sup> and Nicholas Polanin<sup>2</sup>

American elm (*Ulmus americana*) was the most popular street tree in the United States until the introduction of Dutch elm disease (DED) (*Ophiostoma ulmi*). Now, several DED-tolerant clones have been identified, and there is hope that tolerant cultivars of the American elm will soon again be on the list of preferred urban forest species. But before the rush to plant, it is important to consider which clones are most tolerant, not only to DED but to other diseases, insects, and various environmental stressors. Local site adaptation as well as form and utility in the landscape also need to be evaluated. We have established several long-term comparison plots of clones of American elm that have shown DED tolerance. Plots are at the following U.S. locations: Rutgers University, New Brunswick, New Jersey; Pennsylvania State University, State College, Pennsylvania; F.A. Bartlett Tree Expert Co., Charlotte, North Carolina; Shaker Heights, Ohio; and other sites. The plots will serve to demonstrate clonal differences in the following characteristics: field tolerance to DED; tolerance to elm yellows (phloem necrosis; samples tested by Rutgers University's Plant Diagnostic Laboratory), elm leaf beetle, any other pests or diseases and abiotic factors such as salt, drought, and air pollution; rate of growth, shape, and size of tree; appearance of general health and vigor, fullness of crown, leaf size and color; and possible G × E interaction (one clone better at one site, another somewhere else).

## MATERIALS

1. **'Jefferson'**, a triploid hybrid between American elm and unknown other parent. Original tree belongs to National Park Service, Washington, DC. Fast growing and does not exhibit systemic wilt

when inoculated with *Ophiostoma ulmi* (Sherald et al. 1994).

2. **'New Harmony'**, a new U.S. Department of Agriculture selection nearly as tolerant to DED as 'Valley Forge' (Townsend et al. 1995).

3. **'Patriot'** ('Urban' × *U. wilsoniana*), which resembles American elm and is highly tolerant to DED, elm yellows, and leaf beetles (Townsend, personal communication).

4. **'Princeton'**, a selection made at Princeton Nurseries in 1922, long before DED arrived in North America. This clone has moderate tolerance to DED (Townsend et al. 1995) and because of its growth rate and mature size and form, it serves as a control for comparison.

5. **'Prospector'**, a *U. wilsoniana* selection that looks like American elm when mature but is reportedly smaller and highly resistant to diseases and insects (Townsend, personal communication).

6. **'Valley Forge'**, a new USDA selection of *U. americana* reported to have the highest DED tolerance of all American elms tested (Townsend et al. 1995).

'Delaware No. 2' was unavailable for this study, as was 'Independence', reportedly the most tolerant clone in the six-clone mixture distributed under the name 'American Liberty'.

## RESULTS AND DISCUSSION

Grown at the New Jersey Forest Tree Nursery since March 31, 1999, the six clones' relative heights and order of bud burst were recorded beginning March 20, 2000. 'Jefferson' averaged 1.5 to 2 ft (45 to 60 cm), 'New Harmony' 2 to 3 ft (60 to 90 cm), 'Patriot', 'Princeton', and 'Prospector' 3 ft (90 cm), and 'Valley Forge' 2 ft (60 cm). All six were dormant, although mature elms

were flowering in New Jersey and Pennsylvania. On March 29, all six were still dormant. On April 16, 'Patriot' and 'Prospector' had burst bud, grown 2.5-in. (6-cm) shoots and small leaves; 'Jefferson', 'Princeton', and 'Valley Forge' buds were swelling and turning green, and 'New Harmony' was still dormant. By August 21, 2000, trees of all clones averaged 5 to 7 ft (1.5 to 2.1 m) tall; no serious pest or diseases were noted during two growing seasons.

The cultivars (clones) in this study grew surprisingly quickly. Fast growth is probably one of the main reasons that elms were so popular throughout the United States. American elm is an indeterminate grower that grows continuously as long as sunlight, temperature, moisture, and fertility are adequate.

'Princeton' (the control clone) is not only a beautiful elm when mature, but a model nursery tree—straight, single-stemmed, and vigorous. It required the least trimming and staking of any of the six clones. The City of Cincinnati, Ohio, is now planting it again (Monroe, personal communication), believing that its moderate DED tolerance together with good sanitation will keep it reasonably disease free.

'Jefferson', the triploid hybrid, looks like a typical American elm at this stage, and if it continues to show DED tolerance, it may become popular. 'Valley Forge' grew crooked at first but now has straightened out. It shows a tendency to re-flush late in the season, and the light green of new growth stands out against the darker green of older leaves. Municipalities may prefer it because it is both a true *U. americana* and also highly tolerant to DED. Of the two *U. wilsoniana* or part *wilsoniana* selections, 'Patriot' is quite manageable

at this stage. 'Prospector', however, is very vigorous but grows in an arching, weeping form and is difficult to straighten. If trimmed to 8 ft (2.4 m), it is reported to straighten afterwards (Townsend, personal communication). It is the goal of this study to accumulate a compendium of information gained 2, 5, and 10 years after planting.

#### LITERATURE CITED

- Monroe, W., personal communication, Forestry Department, City of Cincinnati, OH.  
 Sherald, J.L., F.S. Santamour Jr., R.K. Hajela, N. Hajela, and M.B. Sticklen. 1994. A Dutch elm disease resistant triploid elm. *Can. J. For. Res.* 24(4):647–653.  
 Townsend, A.M. personal communication. U.S.D.A. Forest Service, Washington, DC.  
 Townsend, A.M., S.E. Bentz, and G.R. Johnson 1995. Variation in response of selected American elm clones to *Ophiostoma ulmi*. *J. Environ. Hortic.* 13:126–128.

**Acknowledgments.** We thank Alan Peaslee and Bob Meierjürgen of the New Jersey Forest Service for many indispensable tasks done in caring for these trees.

<sup>1</sup>Ph.D., Associate Professor of Forestry  
 Department of Ecology, Evolution & Natural  
 Resources  
 Cook College, Rutgers University  
 New Brunswick, NJ, U.S. 08901

<sup>2</sup>Agriculture & Resource Management Agent  
 Rutgers Cooperative Extension  
 310 Milltown Road  
 Bridgewater, NJ, U.S. 08807

\*Corresponding author