

TREE CARE INDUSTRY

The Official Publication of the Tree Care Industry Association

Volume XV, Number 6 - June 2004

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Trees – A Threat to Homeland Security?

By Dr. Bonnie Appleton

While countries around the world scramble to deal with the looming threat of terrorism, a potentially catastrophic problem populates the landscapes that surround our homes, schools, offices and other places of daily life. Sound like the opening for a sequel to Planet of the Apes, War of the Worlds or some other Hollywood creation? Sadly, it's the real world scenario all too common in urban, suburban and even rural portions of our country.

While extra measures are taken to safeguard the facilities that produce electricity against a threat from people, trees – the main focus of our industry – are also a threat to homeland security. This threat is real and imminent and needs to be recognized and dealt with as quickly as possible.

Need recent examples? How about the three trees blamed for the Aug. 14, 2003, power outage that blackened the world of 50 million people in the northeastern portion of the United States and eastern Canada for up to four days.

Or Hurricane Isabel, which only slightly more than a month later, in September 2003, caused thousands of trees along the mid-Atlantic Coast to lean, break and uproot, snapping utility poles, ripping off transformers and pulling down hundreds of miles of utility lines. In her aftermath, 1.8 million customers of Dominion Virginia Power (82 percent of that company's customers) were at the mercy of more than 14,000 utility workers and arborists from 18 states and Quebec for the restoration of electricity. Dominion renamed Isabel "the storm of trees," and this storm obviously made strategically important areas such as Washington, D.C., and southeastern Virginia, with its heavy military concentration, very vulnerable.



Directional pruning to which the public adversely reacts (sugar maple). Photos courtesy of Bonnie Appleton, Virginia Tech Hampton Roads Agricultural Research and Extension Center.

While human terrorists are hard to uncover and predict, hazard trees are neither hard to find nor are their potential targets or consequences difficult to envision. Trees are especially a threat to homeland security when paired with uncontrollable acts of nature such as hurricanes, ice and snow storms, tornadoes, floods and fires.

Tree contributions

Far be it for anyone to deny that trees are invaluable assets in commercial, private and public landscapes. Trees add aesthetic beauty, modify and enhance our environment, serve architectural and engineering functions, and increase property and community economic values. These same trees

that enhance landscapes, however, are a major challenge for utility companies. Most people have grown accustomed to reliable, uninterrupted electric, telephone and cable service to their homes and offices. Unfortunately, trees are one of the major causes of power outages in areas with overhead utility lines due to direct tree contact with lines (approximately 15 percent of outages), or to trees or tree limbs that are outside the utility easement falling on the lines (approximately 85 percent of outages).

Trees vs. live wires

When trees contact live wires they become conductors of electricity. Fires and power outages often result, or dangerous situations are created for anyone coming in contact with the trees. Utility companies spend at least \$2 billion annually on labor and materials for tree pruning, removal and cleanup. This maintenance work is necessary to protect both the public and utility company employees who service the lines, and to insure safe, reliable electrical service.



The public generally does not understand that this type of line clearance is necessary if they are to be assured of uninterrupted electricity, phone and cable service (pine).



A utility line arboretum at Virginia Tech's Hampton Roads Agricultural Research and Extension Center (HRAREC), Virginia Beach, just after initial planting in October 1994. Three poles and two spans of lines were erected by Dominion (Virginia Power). See next page for the same trees nine years later. Photos courtesy of Bonnie Appleton, Virginia Tech HRAREC.

While none of us want to risk losing this service, most of us dislike seeing trees removed or pruned in form-compromising ways in order to provide that service. The practice of planting tree species with potentially inappropriate mature heights, or erecting utility lines where tall trees already exist, greatly increases these problems. In addition, utility companies incur public relations problems and costs due to public criticism of tree management within easements.

Conflict resolution options

Line-clearance methods for existing utility line vs. tree conflicts, such as natural, lateral and directional pruning, have been developed to minimize the impact of pruning on tree health. Unfortunately people very often find this necessary pruning to be aesthetically unacceptable.

Options in addition to, or in combination with, pruning for dealing with utility line/tree conflicts include the use of tree growth regulators, tree height control by pollarding (yearly pruning back to one trunk or branch area) and initiation of tree pruning far in advance of tree-line interception. Another option – whole tree removal – often preferred by utility companies, eliminates the conflict but frequently

impacts the environment and community negatively. Though each of these options aids in preventing future conflicts, they still represent costly maintenance.

The best option to the tree vs. utility line conflict is to prevent those conflicts in the first place. Where practical or economically feasible, new utility lines can be



Red bud (Cercis canadensis) is one example of trees being featured, or trialed, at the HRAREC utility line arboretum.



This is the same utility line arboretum, at the Virginia Tech HRAREC, that is pictured on the previous page, but this photo was taken nine years later, in June 2003.

installed underground or routed to avoid existing trees. Always an option, however, is the selection of appropriately sized trees

under or near overhead lines. This option is available to anyone involved with landscape design and installation – city

planners, landscape architects, designers and contractors, arborists and private homeowners. Proper selection and planting of trees under or near overhead utility lines can improve the appearance of our landscapes, prevent safety hazards, improve electric-service reliability, and reduce line-clearance expenses for utility companies and their customers.

Virginia's MTRP

In part to address the tree vs. utility line conflict, we've started an MTRP – Municipal Tree Restoration Program – in Virginia. Our program was initially inspired and modeled after an MTRP in Pennsylvania. Public and private partners in Virginia's MTRP include the Virginia Department of Forestry, Virginia Tech, the Virginia Design Assistance Center, Virginia Cooperative Extension, Scenic Virginia, Mid-Atlantic Chapter/ISA, Virginia Nursery and Landscape Association, National Arboretum,

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Virginia's three major utilities – Allegheny Power, American Electric Power, Dominion (Virginia Power) – coop Rappahannock Electric, and several towns and cities.

One of Virginia MTRP's major projects is the development of utility line arboreta. What's a utility line arboretum? It's what I started in 1992 at Virginia Tech's Hampton Roads Agricultural Research and Extension Center (HRAREC) in Virginia Beach. Tired of topped and improperly pruned trees under or near overhead utility lines, former graduate student Barbara Touchette and I set out to develop a display planting that would trial and highlight more appropriately sized small trees and large shrubs. Dominion Virginia Power, the local service provider, installed three poles and two spans of uncharged lines on the HRAREC property, and Barbara and I began obtaining and installing small to medium trees and large shrubs for evaluation.

Over the past 10 years, more than 150 small- to medium-size trees and large shrubs have been planted and observed. Some, having grown too tall, too slowly, or too wide for street-side planting, have been removed. Others still stand, reflecting desired characteristics, including:

not more than 20 to 30 feet at maturity, relatively low maintenance (no frequent pruning, no major pest problems, no major litter or messy fruits, leaves or twigs), tolerant of adverse urban conditions (limited soil volume and moisture, compacted soil, air pollution, etc.), and having a slow to moderate (never fast) growth rate.

Funding to obtain the trees and shrubs has been provided by the Virginia Agricultural Council, the Virginia Nursery and Landscape Association, and the Virginia Urban and Community Forestry Assistance Grant Program. A new sign was recently constructed and donated by the city of Virginia Beach. Now that most of



Fragrant snowbell (Styrax obassia).

the more commonly available trees have been planted at the HRAREC utility arboretum, a search is on for more unusual trees. This year many new trees were purchased from mail order nurseries.

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The following is a list of some of the small- and medium-size trees and large shrubs currently being evaluated at the HRAREC utility line arboretum.

<i>Acer campestre</i> 'Royal Ruby'	<i>Cercidiphyllum japonicum</i> 'Heronswood Glode'	<i>Phellodendron chinense</i>
<i>Acer circinatum</i>	<i>Cercis canadensis</i> 'Appalachian Red'	<i>Phellodendron japonicum</i>
<i>Acer fabri</i>	<i>Cladrastis lutea</i> 'Rosea'	<i>Phellodendron lavallei</i>
<i>Acer glabrum</i>	<i>Crataegus ambigua</i>	<i>Prunus incisa</i>
<i>Acer henryi</i>	<i>Crataegus kansuensis</i>	<i>Prunus nigra</i>
<i>Acer maximowiczii</i>	<i>Crataegus pinnatifida</i>	<i>Prunus pensylvanica</i>
<i>Acer monspessulanum</i>	<i>Cratogeomyspilus dardarii</i> 'Asnieresii'	<i>Prunus sargentii</i> 'Columnaris'
<i>Acer mandshuricum</i>	<i>Dipteronia sinensis</i>	<i>Prunus serrulata</i> 'Amanogowa'
<i>Acer negundo</i> 'Sensation'	<i>Fraxinus excelsior</i> 'Aurea'	<i>Prunus</i> 'Spire'
<i>Acer opalus obtusatum</i>	<i>Fraxinus excelsior</i> 'Aureafolia'	<i>Prunus virginiana</i> 'Shubert'
<i>Acer pseudosieboldian</i>	<i>Hamamelis</i> 'Firecracker'	<i>Prunus x yedoensis</i> 'Akebono'
<i>Acer robustum</i>	<i>Hovenia dulcis</i>	<i>Pterostyrax psilophylla</i>
<i>Acer sinensis</i>	<i>Magnolia</i> 'Butterflies'	<i>Rhus potaninii</i>
<i>Acer sterculiaceum</i> (franchetii)	<i>Magnolia cylindrica</i>	<i>Sorbus cashmiriana</i>
<i>Acer tataricum</i>	<i>Magnolia proctoriana</i> (kobus) 'Wada's Memory'	<i>Sorbus discolor</i>
<i>Acer tetramerum</i>	<i>Magnolia sieboldii</i>	<i>Sorbus x thuringiaca</i> 'Fastigiata'
<i>Acer triflorum</i>	<i>Magnolia wilsonii</i>	<i>Stewartia rostrata</i>
<i>Acer ukurunduense</i> (caudatum)	<i>Malus kansuensis</i>	<i>Stewartia sinensis</i>
<i>Aesculus woerlitzensis</i>	<i>Parrotia persica</i> 'Vanessa'	<i>Styrax japonicum</i> 'Snowcone'
<i>Amelanchier asiatica sinica</i>	<i>Parrotiopsis jacquemontiana</i>	<i>Sycoparrotia semidecidua</i>
<i>Amelanchier laevis</i> 'Snowcloud'		<i>Ulmus parvifolia</i> 'Evergreen'
<i>Carpinus turczaninowii</i>		

For more details about the conflict between street trees and utility lines, and to see lists of appropriately and inappropriately sized trees, consult Dr. Appleton's extension publication. (Virginia Cooperative Extension 430-029 – Trees and Shrubs for Overhead Utility Easements – available through the VCE Web site at <http://www.ext.vt.edu/pubs/trees/430-029/430-029.html>).

As a size reference, I designed our utility line arboretum with one red maple and one London planetree, trees that are normally too tall for direct planting under overhead lines. We planted each directly under one of the two spans as reference trees and reminders of how quickly trees will grow tall and interfere with the lines and electrical service. Signage explains this inappropriate height situation to anyone visiting our arboretum. Every few years at our HRAREC annual nursery/landscape field day, Dominion Virginia Power and Asplundh have co-sponsored a pruning demonstration using these two "too big" trees. The trees are pruned according to ANSI (American National Standards Institute) standards for utility pruning to illustrate to the landscapers and arborists present what proper directional pruning should look like if the wrong tree is selected for planting in a utility easement.

where poles and uncharged lines are erected specifically to develop a demonstration area, is an example of just one type of utility line arboretum that MTRP is helping to develop in Virginia. We are also developing two other types. In several cities the local utility company is working with city employees and citizens to identify and remove inappropriately tall and hazardous trees in or near utility line easements along main streets. The trees are removed and compatible small trees are planted. The first utility line arboretum of this type was developed in the southwestern Virginia town of Abingdon. In several other towns and cities we will be developing a third type of utility line arboreta in parks or other public areas where lines already exist but where there are no trees currently planted underneath. For these unique efforts, Virginia's MTRP won Scenic Virginia's 2003 Most Creative Scenic Improvement award.



Cornelian cherry (Cornus mas).

the site of other activities. It is used for woody landscape plant identification for a class taught through Tidewater Community College's (Chesapeake) Horticulture Program, and by the Virginia Beach Tree Stewards (through Virginia Cooperative Extension) as a volunteer activity (pruning, weeding, etc.). Recently, students in the Norfolk Botanical Garden's new Arborist Training Program, which targets at-risk youth, planted some of the newly obtained trees. These students will also be helping with pruning maintenance.


The HRAREC and other utility line arboreta in Virginia will bring additional attention to the need for "right plant/right location," and will enable tree and shrub evaluation under the various environmental conditions that exist across four hardiness zones in Virginia. It will also be a place that industry and citizens alike can view small trees that will fit many urban landscape sites. The HRAREC utility arboretum was mentioned in the local newspaper after Hurricane Isabel, with many people subsequently visiting to get ideas of more appropriate replacement trees. Virginia MTRP hopes to share its utility line arboreta projects, and others, via its Web site, www.utilitywisetrees.com, which is under construction.

Dr. Bonnie Appleton is a professor of horticulture for Virginia Tech, based at the Hampton Roads AREC in Virginia Beach, Va.



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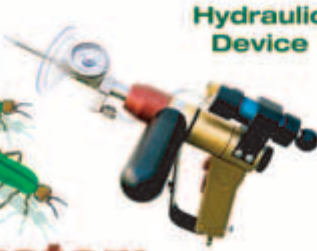
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