

DEVELOPING A UTILITY LINE ARBORETUM

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Abstract. Distribution of publications discouraging the practice of planting inappropriately-tall trees under utility lines has not been particularly effective as evidenced by their continuing selection. To create higher visibility of both this problem and one solution, the use of smaller trees as well as large shrubs, a utility line arboretum was developed to showcase potentially superior tree and shrub selections for the utility line - street tree conflict area.

Trees are valuable assets to commercial, private, and public landscapes. Trees are used to augment or modify many aesthetic, architectural, climatic, and engineering features in landscapes and, in addition, they increase property value.

Unfortunately, trees can be a major expense to utility companies. Utility companies spend over \$1.5 billion annually on labor and materials for tree pruning and removal caused by the selection and planting of tree species with inappropriate mature heights (16), or the erection of utility lines where tall trees already existed (Figure 1). An additional indirect expense incurred by utility companies maintaining overhead line easements is the public relations problem that develops when the public is critical of the management (especially pruning) of trees in these easements (18).

Despite publicity warning against the use of

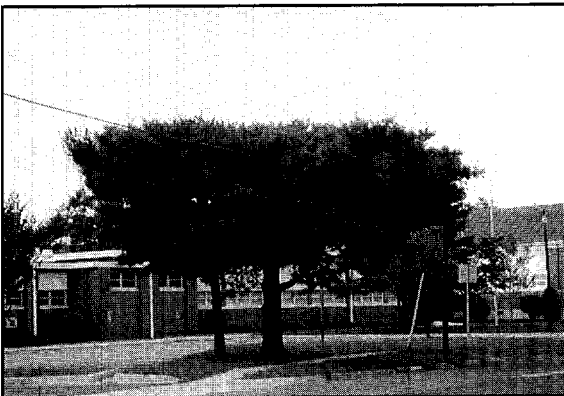


Figure 1. Utility line - street tree conflict problem - inappropriately tall tree planted directly beneath a utility line. (eastern white pine)

trees that are too tall, poor tree species selection continues. Though line clearance pruning methods such as natural, lateral, and directional pruning have been developed to minimize tree disfigurement (14) (Figure 2), these methods are not universally employed (1).

Several additional options exist for dealing with the utility line - street tree conflict (6, 7, 10, 17, 20). On one extreme, new tree planting in utility easements can be prohibited with all trees existing in easements removed and not replaced. On the other extreme, planting of trees whose mature height exceeds utility line heights can continue with accompanying tree disfigurement

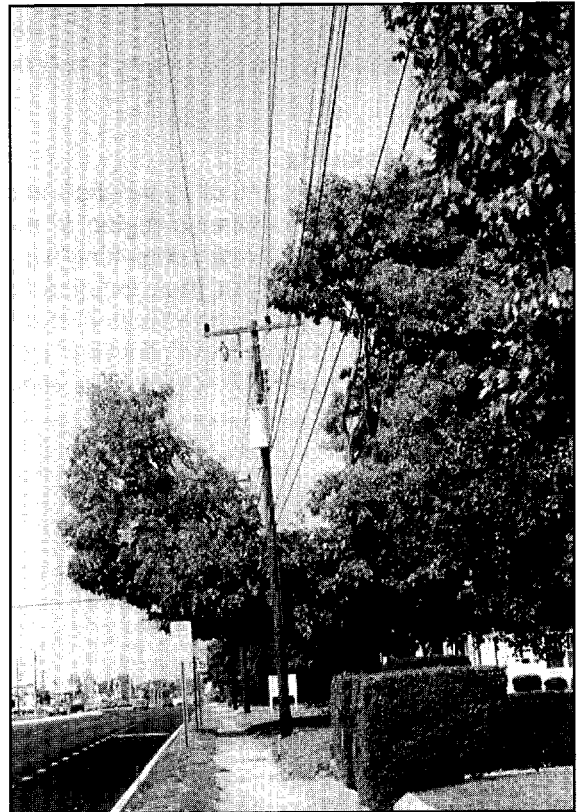


Figure 2. Utility line - street tree conflict solution - directional pruning often found unacceptable by the general public. (sugar maple)

due to clearance pruning. Between these extremes are options including the use of tree growth regulators (4), installing utility lines underground, the use of more tree-resistant utility line equipment (13), using offset tree spacing (near but not directly under lines) (Figure 3), controlling height by pollarding (Figure 4), and initiating tree pruning far in advance of tree - line interception.

Though most utility companies recommend not planting directly under utility lines, this is difficult to follow because in most urban areas the major planting spaces currently existing or designed for street trees coincide with the utility easement areas. An option is to use more appropriately-sized plants. The objectives of this ongoing research were to develop a highly visible demonstration area where a large collection of small trees and large shrubs for possible utility easement use could be observed by consumers and industry alike, and where localized plant growth rates and maintenance needs could be determined.

Materials and Methods

A survey of municipal and utility arborists and horticulturists in the Mid-Atlantic region of the United States revealed that many commonly used street trees were too tall for their locations if planted within utility easements (unpublished, 1993). Of the top ten trees named, seven (*Pyrus calleryana*, *Quercus palustris*, *Quercus phellos*,

Acer rubrum, *Pinus strobus*, *Platanus occidentalis* or *Platanus x acerifolia*, and *Acer saccharinum* in descending order of frequency used), had average mature heights exceeding the 25' to 35' height at which electric lines (phone and cable TV lines may be lower) are generally strung (3). Only three (*Cornus florida*, *Lagerstroemia indica*, and *Malus* sp.) had mature heights that could be considered utility-line appropriate.

From suggestions given by the above respondents, pamphlets from a variety of organizations and utility companies (Carolina Power and Light, Detroit Edison, Gainesville Regional Utilities, International Society of Arboriculture, PacifiCorp, Portland General Electric, TU Electric, Virginia Power, Wisconsin Electric), and a variety of other consulted references (5, 8, 9, 10, 11, 12, 15, 21, 22), a list



Figure 3. Utility line - street tree conflict solution - off-center planting of fastigiate trees vs. planting directly beneath utility lines. (Right-ginkgo; left-oak)



Figure 4. Utility line - street tree conflict solution - pollarding for height maintenance. (London planetree)

was compiled of small trees and large shrubs with heights potentially appropriate for use directly under utility lines. In the fall of 1994, three poles and two spans of unenergized electrical wire were installed by Virginia Power on the grounds of Virginia Tech University's Hampton Roads Agricultural Research and Extension Center in Virginia Beach (USDA Hardiness Zone 8a). With funding from the Virginia Urban and Community Forestry Grant Assistance Program and the Virginia Nurserymen's Association, plants were purchased and installed in what is now called the "Utility Line Arboretum" (Figure 5). Trees and shrubs were planted in rows in the utility easement on 15' centers. Due to financial constraints only one plant per species selected has been planted.

From 1994 to 1995, 97 small trees and large shrubs were planted (19). In the spring of 1996, fourteen additional trees deemed appropriate for mid-Atlantic conditions were selected and planted from the new J. Frank Schmidt & Son Co., Boring, OR, line of UtiliTrees™ (*Acer campestre*, *Acer platanoides* 'Globosum', *Amelanchier x grandiflora* 'Cole's Select', *Amelanchier x grandiflora* 'Princess Diana', *Crataegus x lavalleyi*, *Fraxinus pennsylvanica* 'Johnson' (Leprechaun™ ash), *Malus* 'Jewelcole' (Red Jewel™ crabapple), *Prunus* 'Berry' (Cascade Snow™ cherry), *Prunus* 'Frankthrees' (Mt. St. Helens[®] plum), *Prunus* 'Newport', *Prunus* 'Tai Haku', *Prunus x cistena* 'Schmidtcis' (Big Cis[®] plum), *Prunus x hillieri*



Figure 5. Hampton Roads Agricultural Research and Extension Center utility line arboretum of small trees and large shrubs.

'Spire', and *Prunus sargentii*. (2).

Each year new plants are being added, and plants that fail to survive, or appear for some reason to be inappropriate (size, growth rate, suckering, litter, etc.) are removed. In addition to the test trees and shrubs, two trees - a red maple (*Acer rubrum*) and a London planetree (*Platanus x acerifolia*) were installed, one under each line span. These trees were planted for height reference and as reminders of trees inappropriately tall for planting under utility lines. When their branches reach the lines, half of each tree will be allowed to continue to grow into the lines and the other half will be periodically topped. Height and caliper (six inches above soil line) are being taken annually for all plants. All plants are labeled with Latin and common names to aid visitors in identification.

Results

After three years a few species died due to transplant difficulties or inappropriate environment. Two others, each dwarf cultivars of medium sized trees - river birch (*Betula nigra* 'Little King') and lacebark elm (*Ulmus parvifolia* - small-leaved, unnamed cultivar from the North Carolina State University Arboretum) - have grown too slowly for use as street trees in utility easements. Based on mature heights listed in the literature (9, 10, 21), several small trees appear to have utility line compatible size due to their form and growth rates (Table 1).

While the concept of using large shrubs to replace large trees is sound, most have been eliminated due to slow growth rates, low branching, multiple stems, and either a tendency to sucker excessively when trained to develop tree form standards or an inability to support their crown (Figure 6). A few large shrubs show good potential (*Cotinus coggygria*, *Hamamelis x intermedia* 'Arnold Promise', *Hamamelis x intermedia* 'Diane', *Hamamelis virginiana*, *Ilex x 'Nellie R. Stevens'*, *Myrica cerifera*, *Photinia x fraseri*, *Viburnum rhytidophyllum*, *Vitex agnus-castus*), and one, crape myrtle (*Lagerstroemia indica*), is already widely used in utility easements in the southeastern United States (Figure 7).

Discussion

The concept of a demonstration utility line arboretum has been well received by both the commercial industry and the public. Site visits have been numerous, and several presentations have been requested on the utility arboretum concept and plants undergoing evaluation, with frequent requests being made for the current plant list.

It is recommended that utility line arboreta be developed on a regional basis in highly visible and accessible locations. Regional collections can emphasize both desirable and undesirable plants relative to local design, environmental and pest constraints. With greater visibility and continued screening of potentially appropriate trees and shrubs, the selection of plants with mature heights compatible with utility lines can be improved.

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Table 1. Small trees with mature heights generally less than 35' for use in utility easements.

<i>Acer buergeranum</i>	<i>Acer ginnala</i> 'Flame'
<i>Acer griseum</i>	<i>Acer palmatum</i>
<i>Alnus glutinosa</i>	<i>Amelanchier laevis</i> 'Cumulus'
<i>Aronia</i> sp.	<i>Carpinus caroliniana</i>
<i>Carpinus japonica</i>	<i>Catalpa x Chilopsis</i>
<i>Cercidiphyllum japonicum</i>	<i>Cercis canadensis</i>
<i>Cercis canadensis</i> 'Forest Pansy'	<i>Cercis canadensis</i> 'Silver Cloud'
<i>Cercis</i> 'Texas White'	<i>Cercis mexicana</i>
<i>Chioanthus virginicus</i>	<i>Chioanthus retusus</i>
<i>Cornus</i> x 'Stellar Pink'	<i>Cornus mas</i>
<i>Cornus mas</i> 'Spring Glow'	<i>Crataegus crusgalli</i> var. <i>inermis</i>
<i>Eriobotrya japonica</i>	<i>Ilex decidua</i> 'Council Fire'
<i>Koelreuteria paniculata</i>	<i>Magnolia</i> x 'Galaxy'
<i>Magnolia grandiflora</i> 'Little Gem'	<i>Magnolia stellata</i>
<i>Magnolia virginiana</i>	<i>Magnolia virginiana</i> var. <i>australis</i>
<i>Malus</i> 'Centurion'	<i>Malus</i> 'Indian Magic'
<i>Oxydendrum arboreum</i>	<i>Parrotia persica</i>
<i>Prunus cerasifera</i> 'Thundercloud'	<i>Prunus mume</i> 'Bonita'
<i>Prunus mume</i> 'Peggy Clark'	<i>Prunus</i> x <i>yedoensis</i>
<i>Quercus myrsinifolia</i>	<i>Stewartia pseudocamellia</i>
<i>Styrax japonicus</i>	<i>Styrax japonicus</i> 'Issai'
<i>Styrax japonicus</i> 'Sohuksan'	<i>Styrax obassia</i>
<i>Syringa reticulata</i> (<i>S. amurensis</i>)	

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Figure 6. PeeGee hydrangea in foreground lacks structural strength for training as a standard. (single trunk)

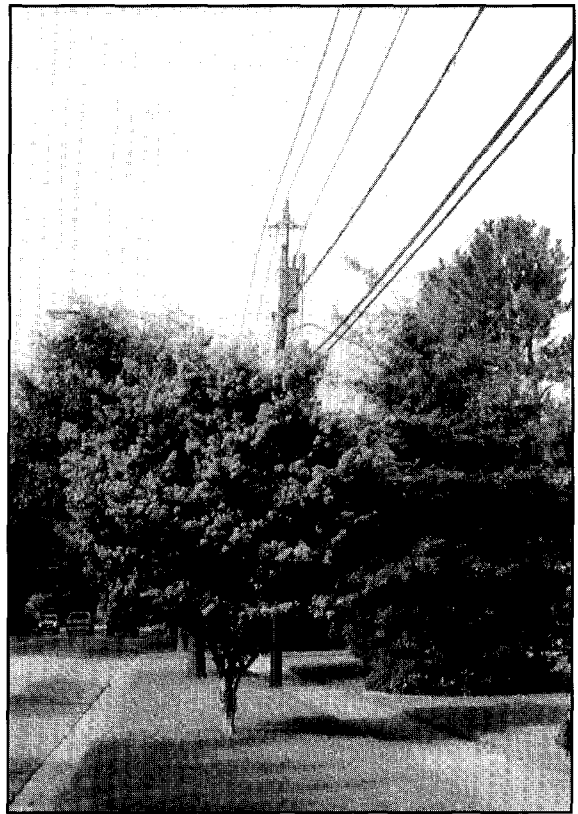


Figure 7. Utility line - street tree conflict solution - use of small trees or large shrubs. (crape myrtle)

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Résumé. La distribution de publications pour décourager les mauvaises habitudes de transplanter des arbres à grand déploiement sous les réseaux aériens de services publics ne s'est pas révélée être très efficace lorsque l'on observe qu'ils continuent à être plantés tous les jours. Afin de rendre plus visible ce problème ainsi que sa solution, soit la plantation d'arbres à plus petits déploiements et de gros arbustes, un arboretum des services publics a été créé pour exposer le problème potentiel de conflit à venir entre les lignes aériennes et la plantation des grands arbres et arbustes.

Zusammenfassung. Die Verteilung von Publikationen, die vor der gängigen Praxis warnen, unter Elektroleitungen unangemessen große Bäume zu pflanzen, war als nicht besonders effektiv, wie durch die anhaltende Auswahl bewiesen wurde. Um eine größere Transparenz für das Problem und die einzige Lösung, nämlich das Pflanzen von kleineren Bäumen und größeren Büschen, zu erreichen, wurde ein Oberleitungsarboretum entwickelt. Hier werden in einem Schaukasten potentiell geeignete Bäume und Sträucher für den Bereich Straßenraum und Oberleitung vorgestellt.