

STREET TREE RESOURCE EVALUATION AND EDUCATION TRUST (STREET)

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Introduction

Benefits of street trees include climate modification, energy savings, improvement of air, soil and water quality, mitigation of storm water runoff, reduction of carbon dioxide and increased property values (Maco and McPherson, 2002). Trees are estimated to have a significant environmental value. The value for a small tree is estimated from \$160 (if planted along a street or roadway) to \$600 (if planted in a yard or street lawn near the house) and a large tree can have net benefits over \$2,320 when planted in a street lawn (McPherson et al., 2006). These values do not include aesthetic, social, or wildlife benefits.

Street tree planting programs also provide social benefits including increased feelings of community involvement and environmental awareness (Thompson et al., 2004). Trees planted along roadways can provide enough shade to extend the life of road pavement. In an area that is well shaded pavement life can be significantly extended. For example, areas in California were able to prolong repaving shaded areas an additional 10 to 25 years (McPherson & Jules, 2005).

It is imperative to plant trees that are appropriate for the location to reduce conflicts between the tree growth patterns and obstacles such as power lines and traffic signs. (McPherson, 2003).

Citizens of Bucyrus, Ohio essentially select, plant, and care for trees in the city tree lawns. This arrangement can be thought of as “trust” in that this land is managed for the benefit of others. However, this “trust” has often been violated by poor tree selection, poor selection of the planting area and incorrect tree maintenance. Street Tree Resource Evaluation and Education Trust, (STREET), was an educational and research project of Ohio State University Extension staff and Master Gardener Volunteers to mitigate negative effects of poor tree species and site selection in Bucyrus, Ohio.

It was hypothesized that through education of homeowners and the example of new tree planting done by home owners, a very positive change could be made not only in the city tree forest, but also on city tree maintenance costs, esthetics, and property values. (New Westminster Parks and Recreation, 2007).

Purpose and Objectives

The purpose of the Street Tree Resource Evaluation and Education Trust (STREET) program was to improve the selection and planting of trees in city street tree lawns and to compare citizen tree planting to professional landscaper tree planting over planting depth and tree survival.

Street Tree Resource Evaluation and Education Trust (STREET) objectives were:

To train Master Gardener volunteers to identify, and inventory Bucyrus street trees; to inventory into an electronic database street trees (trees growing in the Bucyrus city tree lawn) by location, species, and size; to write a grant to obtain funding for purchase of street trees; to educate citizens on street tree planting by site selection, planting depth and species; to survey new tree planting over survival, planting depth, and twig growth (length) by citizen and professional landscape contractor.

Methods

Presentations were made to the Bucyrus City Council with the purpose of educating legislators to the benefits of improved selection, placement and care of city trees and to obtain permission to survey city trees.

Master Gardeners were trained through lectures and street walks to identify common trees and record the data into a spread sheet. The Master Gardeners surveyed sites at 2102 street addresses recording tree species, size, and location as well as identifying approximately 200 potential tree planting sites.

A grant was written to a local foundation that was funded at \$5,000 to purchase trees to be planted by both city residents and commercial firms at approved sites. Additional funding of \$4,000 was provided by the city of Bucyrus after educational sessions were made to city administrators.

A list of potential street trees was compiled via a review of the literature, a tree planting fact sheet, and a site selection form were created for the program. The program was advertised through local media and applications were disseminated to citizens by the city of Bucyrus. Only citizens willing to fill out the educational tree site selection form were eligible for trees.

The STREET tree application was used both as an educational aid to citizens and a tree site selection tool. It included the following items to be answered by applicants: Overhead utility lines located above the street tree lawn; utility poles present in the street tree lawn; stop signs located in the street tree lawn; street tree lawn(s) on a corner lot (intersection of two streets); street tree lawn(s) wider than 4 feet; locations of underground gas and water lines known; existing trees growing in the street tree lawn.

Tree planting site measurements were recorded for the first two years of the program. A Microsoft Excel Spreadsheet was created to organize and record data on the tree plantings. In the late summer of 2006 and in August 2007 new tree planting sites were visited. Data collected included:

Depth of planting measured where the root flare was in inches below or above grade; tree growth measured by averaging the new growth on 3 branches; tree condition (survival) was measured using the following scale.

A tree's condition was rated on a scale from 0 to 4. Scores of 4 indicated the tree was in excellent condition (6" or more new growth), 3 indicated good condition (new growth present but less than 6"), 2 indicated fair condition (no new growth, nearly all leaves present on tree), 1 indicated poor condition (no new growth, less than 50% of the tree's leaves present), and 0 indicated that the tree had died.

Results

Surveys were conducted by the Master Gardeners on 2102 street addresses approximately 200 potential tree planting sites were identified. Silver Maples, which are prohibited by Bucyrus's city ordinance, accounted for 27.7% of the trees planted in the street tree lawn. There were 54 species of woody plants growing in the street tree lawn. The most common tree species located in the Bucyrus street tree lawn were silver maple (27%), norway maple (17%), sugar maple (15%), crabapple (8%), and callery pear (4%).

During the programs first year (2006) 98 trees were planted with an additional 96 trees planted in 2007. The trees planted were selected based on their appropriateness for the Bucyrus sites, soils, cold and heat hardiness, and drought tolerance. Small trees such as crabapple and serviceberry were utilized for sites with overhead utility lines. Sites with no obstructions and an adequate tree lawn were planted to larger trees such as sugar maple and hybrid elm cultivars.

In both 2006 and 2007 tree losses have been low. However, up to 5% of trees are expected to be lost due to being planted too deep. The overall survival rate of all STREET trees planted in 2006 and 2007 was 97.9% (Table 1).

Table 1

Tree survival rate (%) for 2006 and 2007 plantings

| | Homeowner Planted | City/Tree Service Planted |
|-------------------------------|-------------------|---------------------------|
| Total Number of Trees Planted | 129 | 65 |
| Number Lost | 2 | 2 |
| Percent Survival | 98.4 | 96.9 |
| Total Percent Survival | 97.9 | |

There is a significant statistical difference between the planting depths of the trees when comparing citizen versus professionally planted trees, however both groups planted trees correctly (Table 2, 3, and 4).

Table 2

Comparison of tree planting depths for citizen and professionally planted trees in 2007

| Planted By | Number of Trees Planted | Mean Above Ground Level (Inches) | Standard Deviation (Inches) | t-Test |
|------------------------------------|-------------------------|----------------------------------|-----------------------------|----------|
| Citizens | 68 | 0.78 | 1.44 | 0.04576* |
| Professional Tree Planting Service | 23 | 0.20 | 1.34 | |

*significant at alpha <.05

Table 3

Planting depth frequencies for 2007 trees planted by citizens

| Planting Depth | Frequency | Percent % |
|-----------------------------|-----------|-----------|
| Greater than 2" above grade | 24 | 35.30 |
| 1" above grade | 20 | 29.41 |
| At grade | 13 | 19.12 |
| 1" below grade | 7 | 10.29 |
| Greater than 2" below grade | 4 | 5.88 |
| Total Trees Planted | 68 | 100 |

Table 4

Planting depth frequencies for 2007 trees planted by professional landscape contractor

| Planting Depth | Frequency | Percent % |
|-----------------------------|-----------|-----------|
| Greater than 2" above grade | 5 | 21.74 |
| 1" above grade | 6 | 26.09 |
| At grade | 3 | 13.04 |
| 1" below grade | 7 | 30.43 |
| Greater than 2" below grade | 2 | 8.70 |
| Total Trees Planted | 23 | 100 |

Table 5

Average of new tree growth in 2006 and 2007

| Year | Number of trees planted | Growth (in.) |
|---|-------------------------|--------------|
| 2006 | 98 trees planted | 4.34 inches |
| 2007 | 96 trees planted | 3.02 inches |
| Average growth for all trees over 2 years 3.68 inches | | |

Conclusions and Implications

Nearly 200 trees have been planted along the Bucyrus city streets over a period of two years, increasing the community’s natural beauty, improving the quality of the city tree forest, while at the same time improving property values.

Educational outcomes of STREET included: strong city government support for innovative tree program (including the transfer of \$4000 dollars to tree acquisition); identification, evaluation, and inventory of Bucyrus street trees by Master Gardener volunteers; grant written and funded at \$5000 for street trees; and education of citizens on appropriate street tree placement and planting. Trees planted by citizens and contractors were analyzed for new growth, depth of planting and survival. Applied research outcomes included: citizen planted trees were higher above grade than the landscape contractor, and citizen tree survival was equivalent to the professional contractor. This study suggests citizens are able, after education, to plant trees with survival rates equivalent to landscape contractors and strong city government support can be obtained for programs such as STREET that empower citizens to improve property values and decrease public maintenance expense.

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