Urban Forestry Outreach, Research & Extension Nursery and Lab

2014 Green Report

Department of FOREST RESOURCES

UNIVERSITY OF MINNESOTA

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University of Minnesota Department of Forest Resources
www.trees.umn.edu

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SHADE TREE
MINNESOTA
SHORT COURSE

Urban Forestry Outreach Research and Extension team, 2013-2014

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2014 MnSTAC Forum photos curtesy of Ken Holman - MN DNR Forestry

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Community Engagement and Preparedness (CEP) Program

Gary Johnson, Department of Forest Resources

Since the first identification of emerald ash borer (EAB) in metropolitan Minnesota in 2009, the CEP program has assisted over 20 communities, largely in greater Minnesota, with training, technical assistance, the analysis of citizen-conducted tree inventories and creation of "Tree Report Cards," and the installation and stocking of community gravel beds. In 2013-2014, the communities that the CEP team either worked directly with or indirectly through various partners included:

- Bemidji
- Brainerd
- Ely
- The Sherburne County Soil and Water Conservation District (Gina Hugo, forester):
    - Becker
    - Big Lake
    - Elk River
    - Princeton
    - Zimmerman

Via this program, each community now has a documented perspective of their community's:

- EAB vulnerability
- Tree genetic diversity
- Urban forest age-class diversity
- Relative Canopy Spread as a function of species
- Condition of all or selected trees in public spaces

Additionally, each community now has the capacity to begin reforesting their urban forests with a cost-effective option: community gravel beds.

Community Capacity Research

Gary Johnson, Department of Forest Resources

For the fifth year, the CEP team has conducted community capacity and sustainable volunteerism surveys. The sustainable volunteer program surveys examine the demographics, inspirations for volunteering and continued engagement of volunteers over a period of time, beginning with their first involvement with a CEP project in their respective community. Pre- and Post- surveys of volunteers entering and completing our training programs and the completion of tree surveys or inventories in their communities help describe the demographics of "typical" volunteers, their attitudes and involvement before and then after the training and project completion. Subsequent surveys (1-3 years after the CEP project) reveal their changing attitudes about trees and their community's urban forest program and their commitment to community volunteerism.

Communities that have received assistance from the CEP team are surveyed before and after the project involvement for their attitudes toward volunteerism, whether new personnel have been hired or internships established, whether they have developed urban forest management plans and whether they continue to use their community gravel beds. These surveys are compared to "paired communities," that is, communities that have not received any technical assistance from the CEP team.

This study is projected to produce its first summary and analysis in 2015.

Community Gravel Beds: A Cost-Benefit Study

Gary Johnson, Department of Forest Resources

A long-term (3-5 year) study is being conducted with selected communities that received technical assistance from the CEP (Community Engagement and Preparedness) team to install and stock community gravel beds with trees. This study compares the survival, growth and condition rates of trees planted as spring bare-root, containerized, balled and burlapped and gravel bed trees. Costs are calculated to include construction of the gravel beds and their maintenance, cost of trees planted, labor and machine hours for planting, and replacements. The communities involved in this project include: Morris, Hutchinson, Rochester, Hibbing. First report due out in 2015.
Preliminary data hint: a 40% loss of gravel bed trees is still more cost-effective than other options.

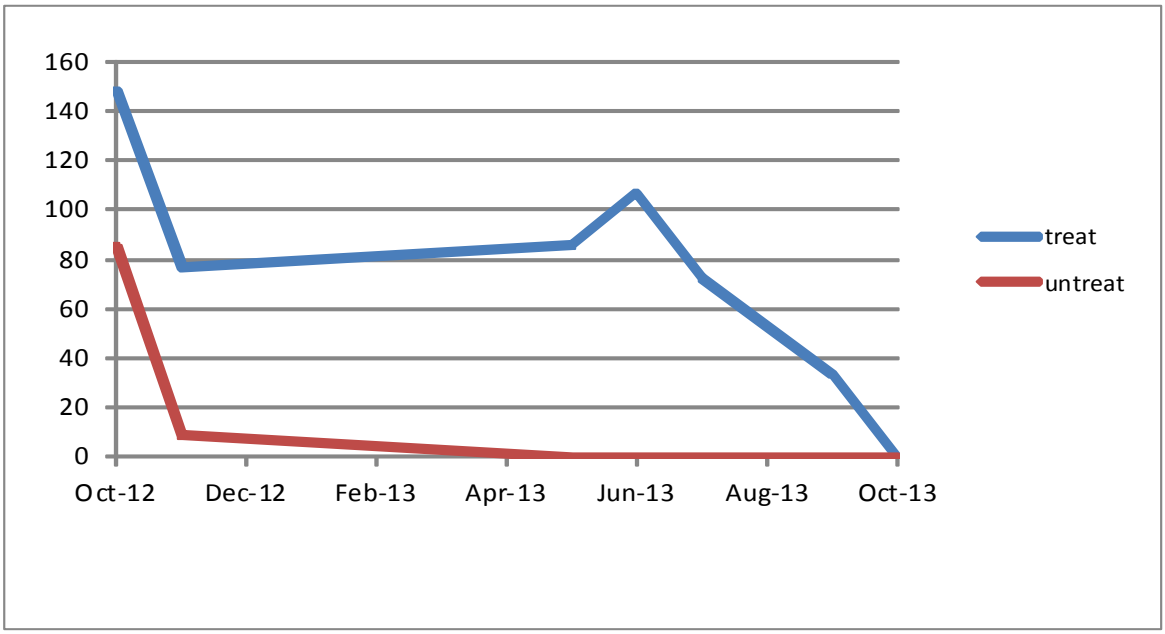
Burlap Decomposition Experiment

Gary Johnson and Antoine Tireau, Department of Forest Resources

Treated and untreated burlap samples were tested for the amount of time required to break down the strength of the materials. Burlap samples were 10 oz, weight, untreated paired with treated (copper napthalate), 12”x24” in size, attached to supports and installed to depths of 24 inches at the UFORE nursery. The soil was a clay-loam, percolation rate of less than 24 hours for a column of water 24” deep, surface mulched rows with mown turfgrass (fine fescue) aisles.

Six randomly selected, paired (treated/untreated) samples were collected every six weeks, beginning in September. A 1.5”x1.5” sample of burlap was cut out from the exact center of each sample and subjected to a tensile strength test. When the breaking point of fibers reached a value of 0.0, the material was considered to be completely decomposed.

Untreated burlaps samples had lost all strength by 12 weeks; treated burlap samples lost all strength by 13 months (see chart below).



Impacts of Burlap and Wire Baskets Experiment

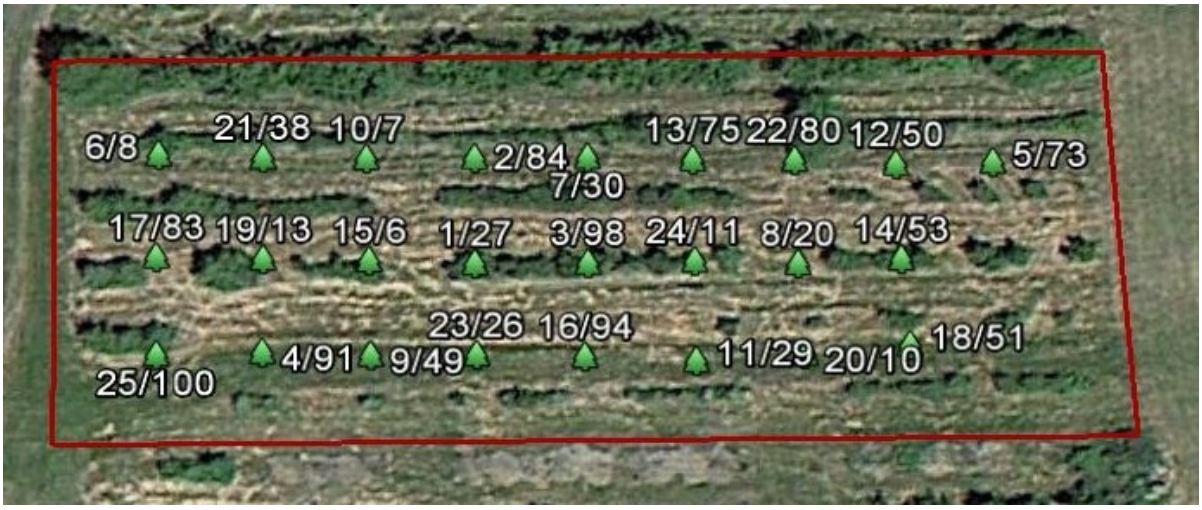
Gary Johnson, Dustin Ellis, Department of Forest Resources

In 2012, a complete randomized block design experiment was set up in two locations in Rochester, Minnesota. Seventy-five trees were planted at North Essex Park and 25 at the Rochester Community and Technical College field nursery. Four tree species were used for the study (elm, honeylocust, freeman maple and crabapple), all trees purchased balled and burlapped.

Treatments: Baskets, burlap and soil removed; untreated burlap; treated burlap; baskets retained with no burlap

Each year, mortality rates are identified, as well as growth (measured as caliper increases) and condition rates are evaluated. In year 5 (2017), all trees will be subjected to a non-destructive root examination for dysfunctional roots/root systems. At year 10 (2022), all trees will receive another root examination for any damages or growth rate aberrations linked to wire baskets or burlap.

RCTC Campus nursery (top); North Essex Park (bottom).



A Case Study of the June 21, 2013 Wind Loading Event in Minneapolis: Tree Failures and the Relationship to Pre-existing Site Conditions

Gary Johnson, Department of Forest Resources

On June 21, 2013, wind storms that had generated west of the twin city metropolitan area of Minnesota (Minneapolis and Saint Paul) moved eastward into Minneapolis in the early evening, accompanied by a torrential rainfall, up to two (2) inches in some areas of the city. Thousands of households were without electricity for several hours or longer due to damaged trees interrupting above ground electrical services and many streets, sidewalks and driveways were blocked for several days.

Anecdotal evidence suggested a higher than normal frequency of total tree failures (i.e., tipped or partially tipped trees, aka, windthrows) in Minneapolis' boulevards, and observations suggested these failures may have been related to pre-existing factors such as recent sidewalk or street improvement activities that severed tree root systems in the process. The University of Minnesota, Department of Forest Resources' Urban Forestry Outreach, Research and Extension lab was contracted to fully investigate this phenomena to determine what if any pre-existing factors may have contributed to the rate of tree failures during this wind-loading event. The University of Minnesota, Department of Forest Resources has been documenting and analyzing wind storm damage to trees since 1995 and was well-posed to conduct this study.

To collect information in the most unbiased and statistically correct manner, the University of Minnesota's Statistical Consulting Center was contracted to design the study. The data collected was comprehensive and included damaged and undamaged trees along the path of the storm in order to determine whether the tree failures were coincidental with pre-existing conditions or indeed related to them. The data set for this randomized and stratified study included 3,076 trees, of which 367 were total failures as a result of the storm. Data collected for each tree included: Tree species, tree size (trunk diameter), location (by address), boulevard width, evidence (physical and Public Works' records) of curb, sidewalk or utility repair or replacement within the last five years and distance from the activity to the tree trunks, and soil attributes: compaction, organic matter content and texture. A generalized mixed modeling analysis was used to determine which variables were associated with root failure (windthrows) of all collected data. All analyses were conducted by the University of Minnesota's Statistical Consulting Center and submitted to the Forest Resources' research team.

1. The major finding is that having replacement work (sidewalk repair) done increased the odds of root failure by 2.24 times ($p<0.0001$). For illustration, when no replacement work was done, the average *Tilia* (linden) had a 10.6% chance of root failure; this increased to 21.0% when replacement work was done.

2. Tree species, when combined with replacement work, was also significant, with *Tilia* most likely to fail, followed by *Fraxinus* (ash), *Acer* (maple) and *Ulmus* (elm). Essentially, when replacement work was done near any one of these trees, the rate of failures more than doubled ($p=.0001$)

3. Tree size, measured as trunk diameter, was significantly related to failure rates, with larger tree diameters more likely to fail ($p=.008$) regardless of whether sidewalk replacement work was conducted.

4. Boulevard width was significantly related to tree failures ($p=.011$) <u>*only*</u> when sidewalk replacement work was conducted. For example, a Tilia in a boulevard four (4) feet wide that had experienced sidewalk replacement damage to its root system had a failure rate of 29.4%. The same tree in an eight (8) foot wide boulevard had a failure rate of 14.6%.

5. Increases in soil compaction (measured as foot pounds of pressure) were significantly related to tree failures ($p=.019$) <u>*only*</u> when sidewalk replacement work was conducted.

6. Replacement work conducted referred to <u>*only sidewalk repair*</u> since not enough instances were observed where curbs had been repaired or replaced within the root zone of trees. In those limited observations (2) the tree did fail.

Heritage Plots with the Forestry Club, St. Paul, MN

Chad P. Giblin – Department of Forest Resources, University of Minnesota

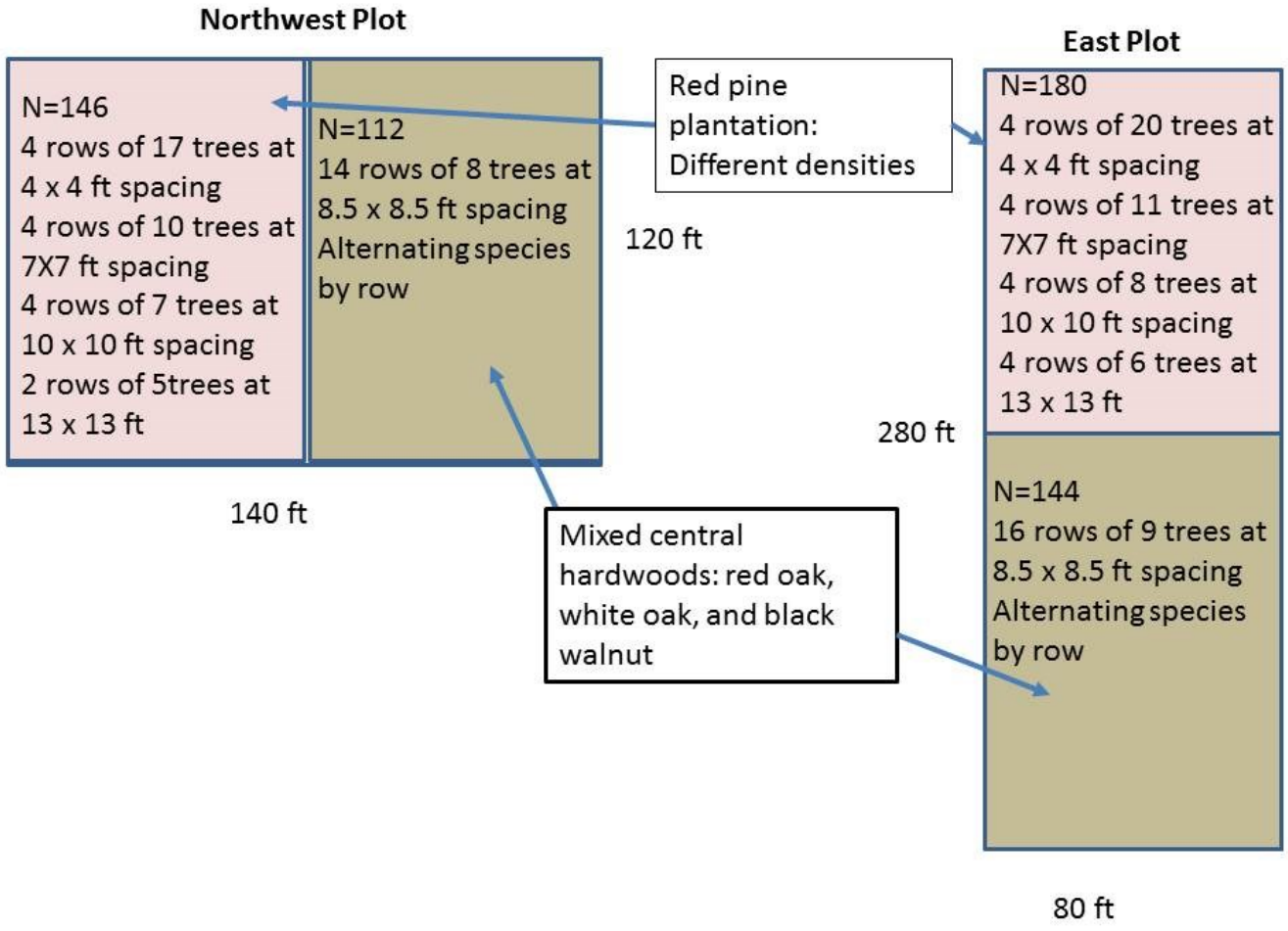
This spring marked the beginning of another exciting partnership at the research nursery with students from the UMN Forestry Club and faculty advisor, Professor Tony D'Amato.

After clearing an overgrown section in the UFORE Field plots, Forestry Club students installed plantations of mixed central hardwoods and red pine, covering about 1.5 total acres. Intended to grow over many years, these plots will offer Forest Resources students the opportunity to visit, manage, and eventually harvest timber directly from the Saint Paul Campus. Species planted include red oak, white oak, black walnut and red pine. Ample spring and summer rains combined with plant protection donated by Plantra, Inc. have given these trees a great start to a bright future.

Deciduous Hardwoods with Tube Protection

Black Walnut Growing in a Plantra SunFlex Tube

Heritage Plot Layout



Tree Establishment Studies in the Armatage Neighborhood

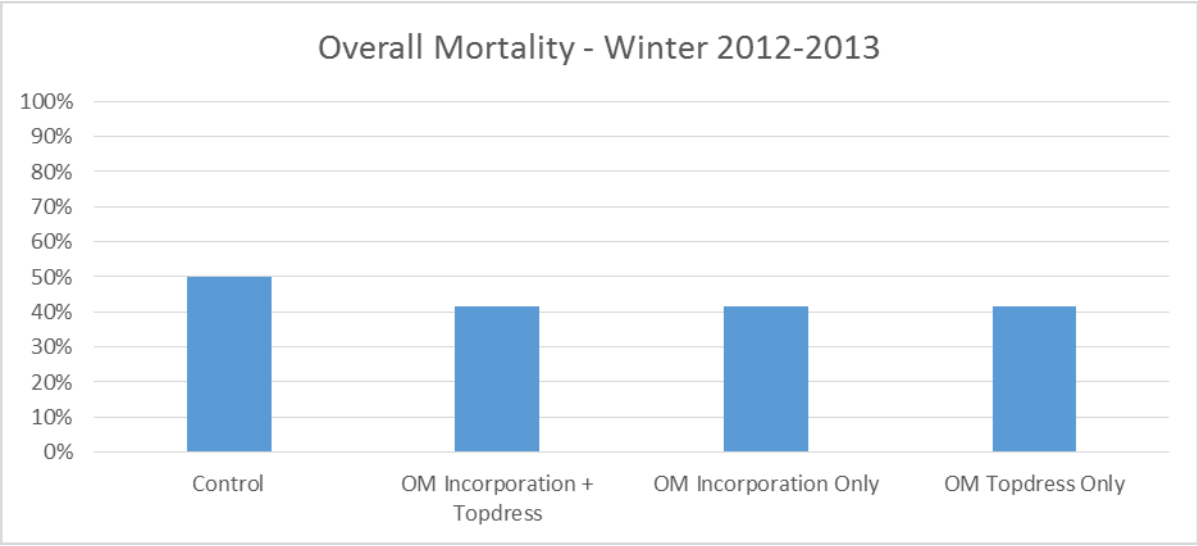
Minneapolis, MN – (2012-2017)

Chad P. Giblin – Department of Forest Resources, University of Minnesota

A major goal of the partnership between the University of Minnesota and the Minneapolis Park & Recreation board is to research new varieties of trees that can survive and thrive in harsh city boulevards. One such tree is Prairie Horizon® Manchurian alder. While relatively new to the Twin Cities area, Prairie Horizon cut its teeth on the tough, dry plains in North Dakota at NDSU's woody plant breeding program led by Dr. Dale Hermann. Previous success with Prairie Horizon in Armatage encouraged expanding its use from one small planting to a neighborhood-level research trial. Small-statured and fast-growing make this a great new potential tree for Minneapolis. Additionally, Armatage is known for its high concentration of green ash, making preparation for ash removals even more critical. With results from this research we hope to find more trees that will fill open planting sites and create soil conditions that will enhance their long-term survival and establishment.

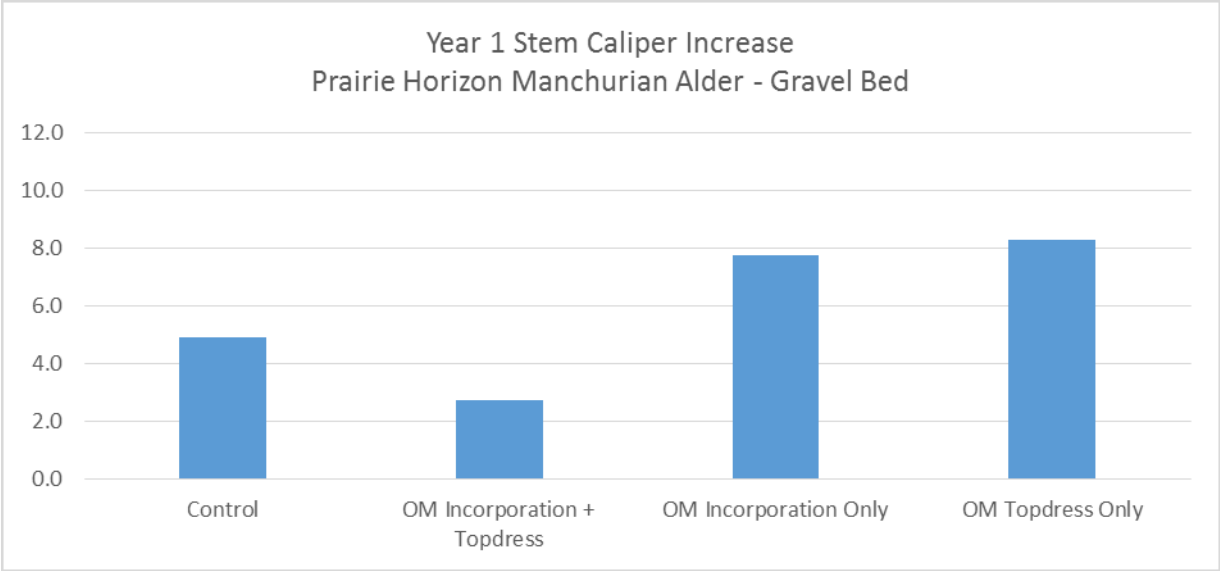
In the growing season prior to installing the project, all trees were established into two different root types. Half were held in both a gravel bed containing 3/8in washed river rock and the other half were containerized into #15 RootTrapper® fabric containers. In the fall of 2012, trees were planted in typical Minneapolis boulevard conditions with different combinations of an organic matter product. This product is produced by a Minnesota company and is made from composted wood waste adjusted to a carbon to nitrogen ratio (C:N) of 20:1. Trees received one of the following treatments, replicated six times for each root type: organic matter topdress (3ft x 2in), organic matter incorporation (added to backfill 1:1 with existing soil), organic matter topdress + incorporation, or no treatment (planted using existing soil only).

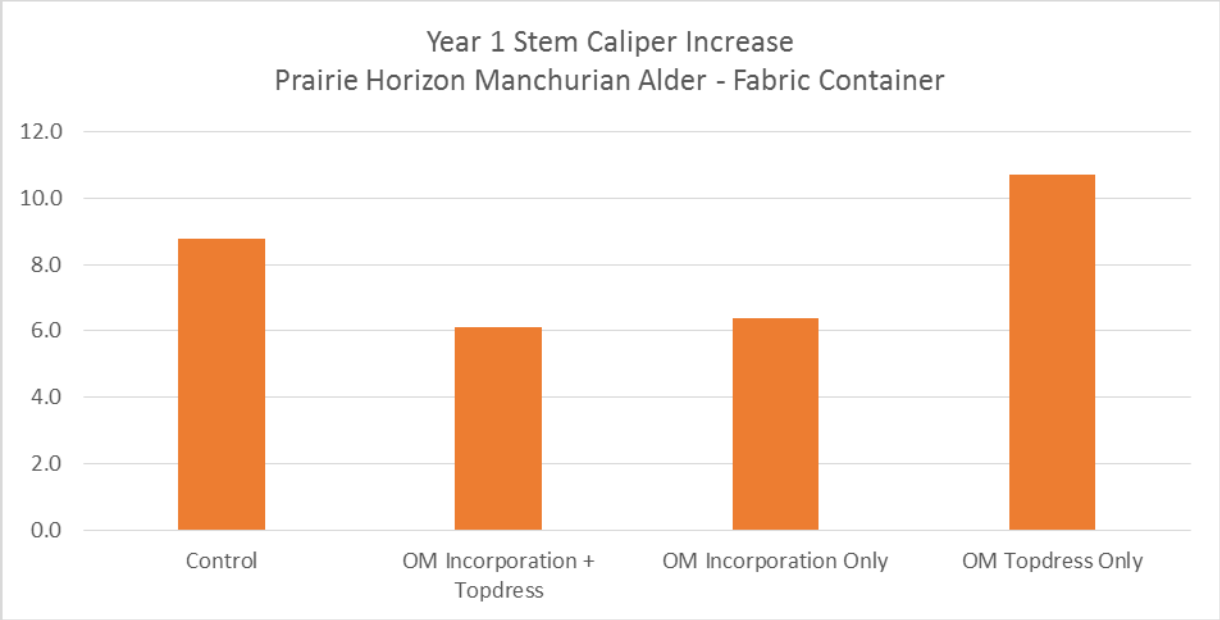
Because of the severe drought the plagued most of Minnesota during 2012, this project experienced higher than expected mortality after the first winter - over one-third of all trees winter-killed. Despite these discouraging losses, preliminary data suggests that the use of any of the three organic matter treatments – in either root type - resulted in an average decrease in mortality of about 8%.



After the first growing season, stem caliper increase was measured and averaged for both the gravel bed and containerized trees. Although this is just first-year data – and collected after an excruciatingly dry season – it suggests that the use of organic matter as a topdress amendment was generally beneficial to tree growth when compared to control trees that received no amendment. This is especially evident in the gravel bed trees. Differences in caliper increase were not as great in the trees containerized into the fabric bags, where this treatment showed some benefit from an organic matter topdress over controls but no benefit from an incorporation treatment or incorporation plus topdress.

Annual data collection for this project will continue until the fall of 2017 including stem caliper measurements and stem and crown condition ratings. A full five year report will be available in early 2018.





Managing Dutch Elm Disease in Resistant American and Hybrid Elms

Chad P. Giblin – Department of Forest Resources, University of Minnesota
Garrett L. Beier – Department of Plant Pathology, University of Minnesota

Introduction

Elm trees are more popular now than ever. Since Dutch elm disease (DED) was introduced to the United States, new selections of American elm and hybrid Asian elms have been selected and released. Now, improved commercial availability of disease-tolerant selections have put them on streets, in parks and backyards across the country.

Although often labelled "DED-Resistant", these elm trees are still susceptible to the disease and in some cases are killed by it. More often, though, their resistance, or more accurately, *tolerance* of the disease allows them to survive an infection in most cases while their wild siblings succumb.

Management

Scouting for Dutch Elm Disease

- Scan the canopy for signs of wilting, yellow or brown foliage or even leafless branches
- Use tools to get a closer look: binoculars, zoom lens, camera, etc.
- Know how to differentiate mechanical damage and breakage from wilting
- If transmitted by root grafts, symptoms may be seen in main stem and on lower branches

Foliar symptoms of DED in Accolade (left) and Valley Forge (right)

Safely Obtaining a Sample

- Collection from the ground – easiest and safest – use pole saw or pole pruners
- Collection from a ladder – use required PPE – and always tie in to the tree
- Other means - bucket truck, professional arborist

Processing the Sample and Diagnosis

- Peel bark or scrape with knife and look for vascular staining under the bark
- Cross section to determine when infected

Peel bark or scrape with knife and look for vascular staining under the bark

Scraped samples of healthy Valley Forge elm (left) and stained, diseased Valley Forge (right)

Cross sections of diseased Accolade elm showing staining in branch (left) and main stem (right)

Submitting a Sample for Lab Confirmation

- Plant Disease Clinic – Department of Plant Pathology, University of Minnesota
- (612) 625-1275 and pdc@umn.edu
- DED Diagnosis and Culture - $59

Sanitation Pruning

- Prune off infected branches, preferably before or at main stem
- Sterilize tools after pruning and between trees with bleach solution or alcohol

Fungicide Treatment

- Depends on size and value of tree
- Severe infections in small trees might warrant replacement rather than treatment

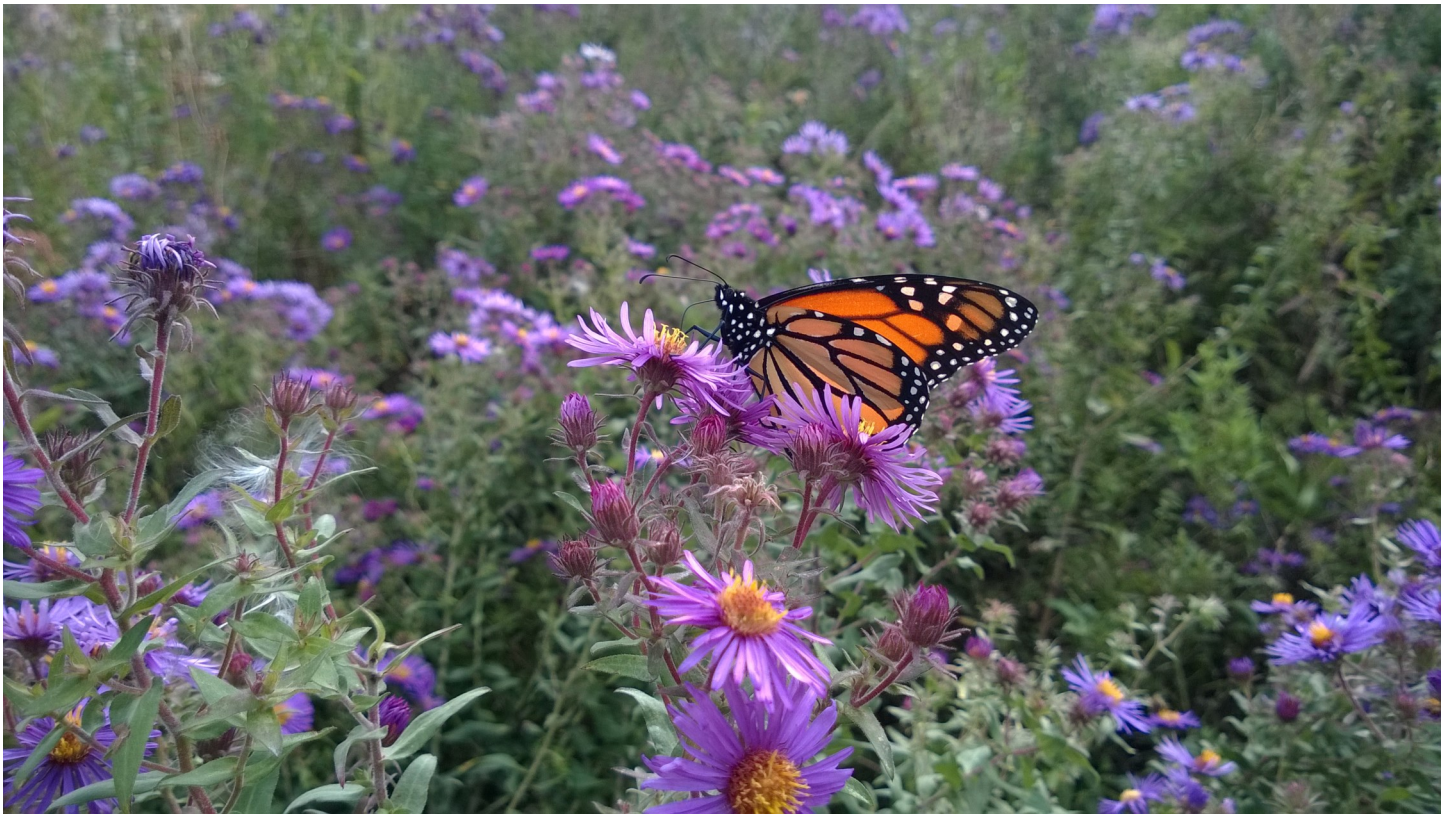
Follow-Up

- Continue scouting and perform vigilant sanitation pruning

Long-Term

- Avoid monoculture, diversify elm plantings with multiple varieties and species
- Water weekly
- Avoid stress and construction damage by protecting root zones.

Waterbags offer a convenient and reliable supply of water to newly planted trees



Trout Brook Nature Preserve Tree Tube and Precision Organics Test Product Amendment Trial

Saint Paul, MN - (2014-2019)

Chad P. Giblin – Department of Forest Resources

Project Description

Establishing urban tree canopy using planting stock other than traditional balled & burlapped (B&B) and containerized nursery stock is of increasing interest in the City of Saint Paul. Preliminary work using small seedlings and tree tubes or shelters dates back to the early 1990s with very successful bur oak plantings at Central High School and more recently with bur oak regeneration in tree tubes at Newell Park in 2013. An open hillside at the new Trout Brook Nature Preserve was planted this spring to research the effects of different tube types, tube colors, and tube heights on bur oak (*Quercus macrocarpa*) growth and establishment.

Additionally, the use of soil amendments at planting has shown to be beneficial in a number of other sites throughout the Twin Cities. In this study a Test Product from Precision Organics (POTP) was incorporated into the plantings at two different rates (3 cup/full rate, 1.5 cup/half rate) in a factorial design with each tube type.

Experimental Design

144 bur oak (*Quercus macrocarpa*) seedlings were planted into a completely randomized, two-way factorial design:

1. 6ft Plantra SunFlex Tube + POTP Amendment at Full Rate
2. 6ft Plantra SunFlex Tube + POTP Amendment at Half Rate
3. 5ft Plantra SunFlex Tube + POTP Amendment at Full Rate
4. 5ft Plantra SunFlex Tube + POTP Amendment at Half Rate
5. 4ft Plantra SunFlex Tube + TP Amendment at Full Rate
6. 4ft Plantra SunFlex Tube + TP Amendment at Half Rate
7. 6ft Tubex (Vented) Tube + TP Amendment at Full Rate
8. 6ft Tubex (Vented) Tube + TP Amendment at Half Rate
9. 5ft Tubex (Vented) Tube + TP Amendment at Full Rate
10. 5ft Tubex (Vented) Tube + TP Amendment at Half Rate
11. 4ft Tubex (Vented) Tube + TP Amendment at Full Rate
12. 4ft Tubex (Vented) Tube + TP Amendment at Half Rate
13. 6ft Plantra SunFlex Tube – No Amendment
14. 5ft Plantra SunFlex Tube – No Amendment
15. 4ft Plantra SunFlex Tube – No Amendment
16. 6ft Tubex (Vented) Tube – No Amendment
17. 5ft Tubex (Vented) Tube – No Amendment
18. 4ft Tubex (Vented) Tube – No Amendment

Each factorial combination was replicated eight times and randomly assigned in the research plot at Trout Brook in one of 144 available planting locations. Trees were two-year old (2-0) seedlings grown in air pruning propagation trays at the University of Minnesota. Seed was collected from a mature stand of bur oak at Newell Park in Saint Paul, MN. Seedlings were randomly assigned to each treatment combination to ensure equal distribution of all sizes and grades across all treatments.

Treatment Application & Planting Detail

All trees were planted into 8 in. wide by 4-6 in. deep holes. Organic matter treatments were uniformly incorporated into existing backfill at planting. All tube treatments were installed using the instructions and materials supplied by the manufacturer at the time of planting. All trees were well-watered at planting.

Data Collection

- Plot layout and treatment locations
- Mortality (Years 1-5)
- Tree height (Years 3 and 5)
- Stem taper (Year 5)
- Stem caliper (Year 5)
- Soil compaction (measured at 15cm and 30cm) will be measured throughout the plot to provide a gridded pattern of soil characteristics

After the initial five year period data will be collected at five year intervals and will consist of the same variables collected during the first five years.

Statistical Analysis

Analysis of results will be performed by Statistical Consulting Services (SCS) at the University of Minnesota and will include full analysis of all collected variables and mean comparisons between treatments. Interactions between factorial combinations and planting site characteristics will also be analyzed for the final report.

Deliverables

A full report of experimental methods, statistical analysis methods, results, and discussion will be given after five years. Preliminary data and a brief discussion of tree mortality growth rate will also be delivered at the end of years one and three.

Selecting Minnesota-Native Elms for Resistance to Dutch Elm Disease Activities & Update (2012-2014)

Benjamin W. Held & Robert B. Blanchette – Department of Plant Pathology
Chad P. Giblin & Gary R. Johnson – Department of Forest Resources

Introduction

Dutch elm disease (DED) was first introduced to the United States in the 1920s and over the past decades it has devastated native elm populations. Like other introduced diseases, the DED pathogen, *Ophiostoma ulmi*, encountered little resistance in its host which led to unabated disease spread across the United States where elms were planted. Despite the tremendous losses, the American elm is still an iconic species because of its elegant form and its suitability for the urban environment. As the disease has progressed through the landscape, some trees have survived in areas with high disease pressure. Survivor elms in Minnesota were identified, clonally propagated and challenged with *Ophiostoma novo-ulmi* to determine levels of resistance. Results indicate that wild type selections die quickly but resistant selections show reduced symptoms, recover and live in both greenhouse and field trials. Recently it was discovered that American elms (*Ulmus americana*) in the United States are a polyploid complex and not mainly tetraploid as previously thought. Ploidy of DED-resistant Minnesota-native American elms will also be presented. This research to identify and test putative resistance of selected American, red, and rock elms is an effort to bring disease-resistant, cold hardy, and aesthetically pleasing native elms back into Minnesota landscapes.

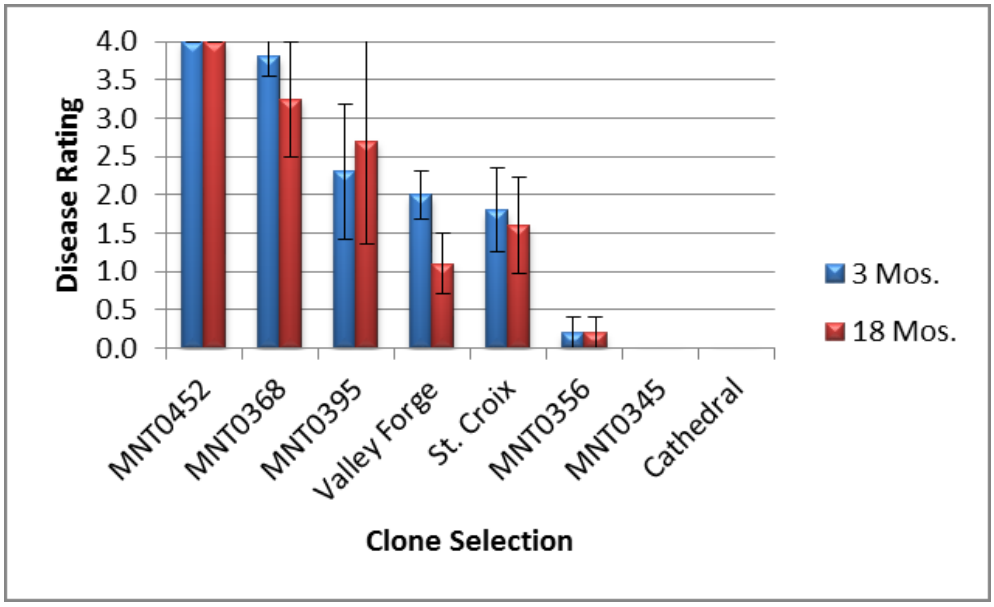
Objectives

- Search for and propagate large survivor elm trees in the Minnesota landscape that have survived heavy disease pressure
- Use greenhouse and field inoculation trials to test selections for DED resistance
- Study effects of disease and resistance transmission in grafted material
- Study resistant elm defense mechanisms
- Study and improve elm propagation techniques

Results

- Currently over 50 trees are being tested in the screening process
- Collections in 2013 and 2014 were focused on survivor elms in both northwest and northeast Minnesota including Otter Tail, Polk and St. Louis Counties
- Several selections show tolerance to DED and are being further tested in field trials
- These results show that resistance in natural populations of elms is a valuable resource in fighting DED
- Ploidy analysis of several resistant selections indicate they are tetraploid
- Investigations in resistance mechanisms are also being conducted
- Vessel morphology, water conductance and grafting effects on disease transmission and resistance

Disease Inoculation Results - 2012



Disease ratings of field inoculated Minnesota elm selections over an 18 month period. Several selections are showing similar tolerance when compared to the Valley Forge selection that has years of proven tolerance.

Northwest Minnesota Collections (2014)

Survivor American elm selections in Otter Tail County (left) and Polk County (right)

Community Tree Treks

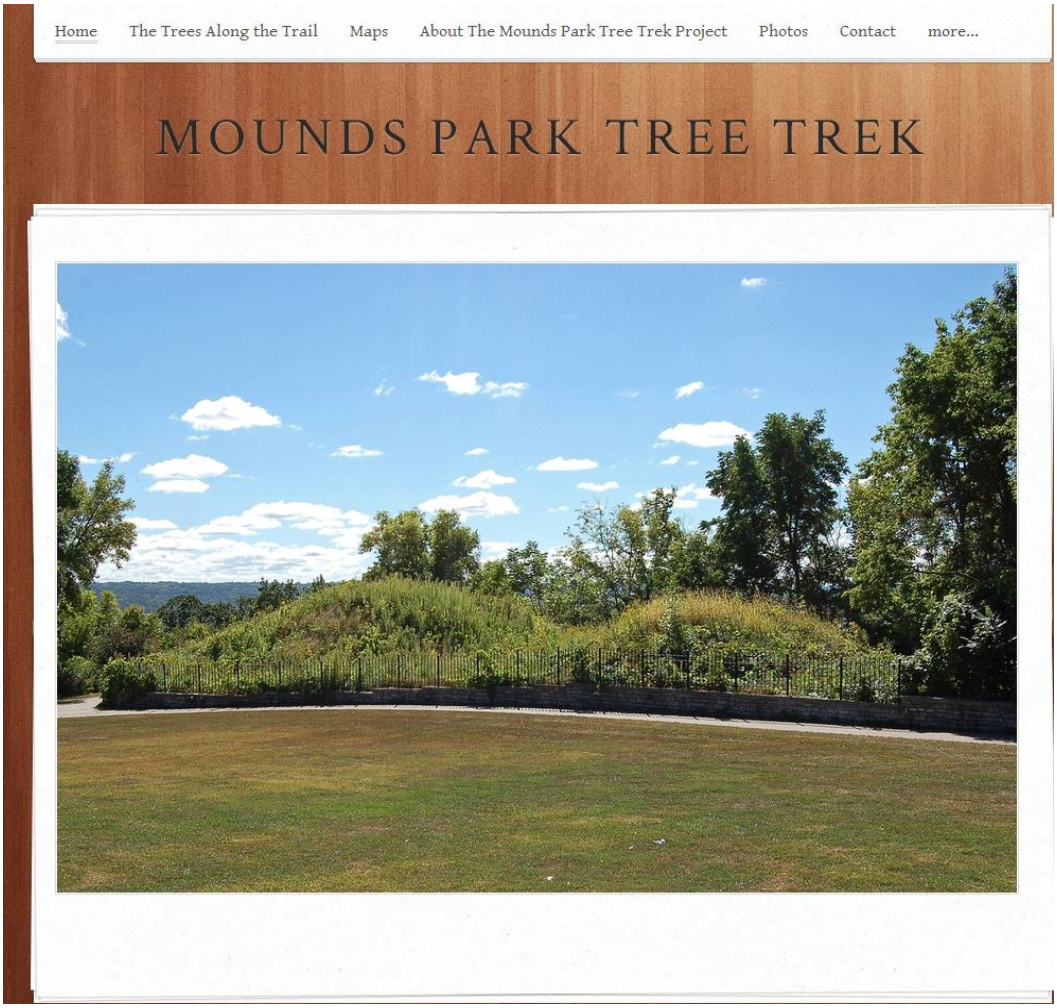
Dustin Ellis. Research Technician. Department of Forest Resources, UMN

Creating educational, useful, and fun activities in park areas can sometimes be a daunting task. Publicly owned park-land usually will have the tried and true playground, ballpark and pavilion, but beyond those amenities there may not be much more to work with for activities. Coming up with new activities that are educational and fun, using only the amenities found at the park can be a challenging task for anyone. There is another amenity that I forgot to mention: trees. Trees are an amenity that can be found at almost all city parks, or at least the parks in Minnesota. The idea to use these ever-present park staples was presented by a Dayton's Bluff resident to the University of Minnesota's Urban and Community Forestry Department and the City of St. Paul's Park and Recreation Department. He presented the plan to create an educational activity that can be implemented at almost any park as long as there are trees, the Tree Trek.

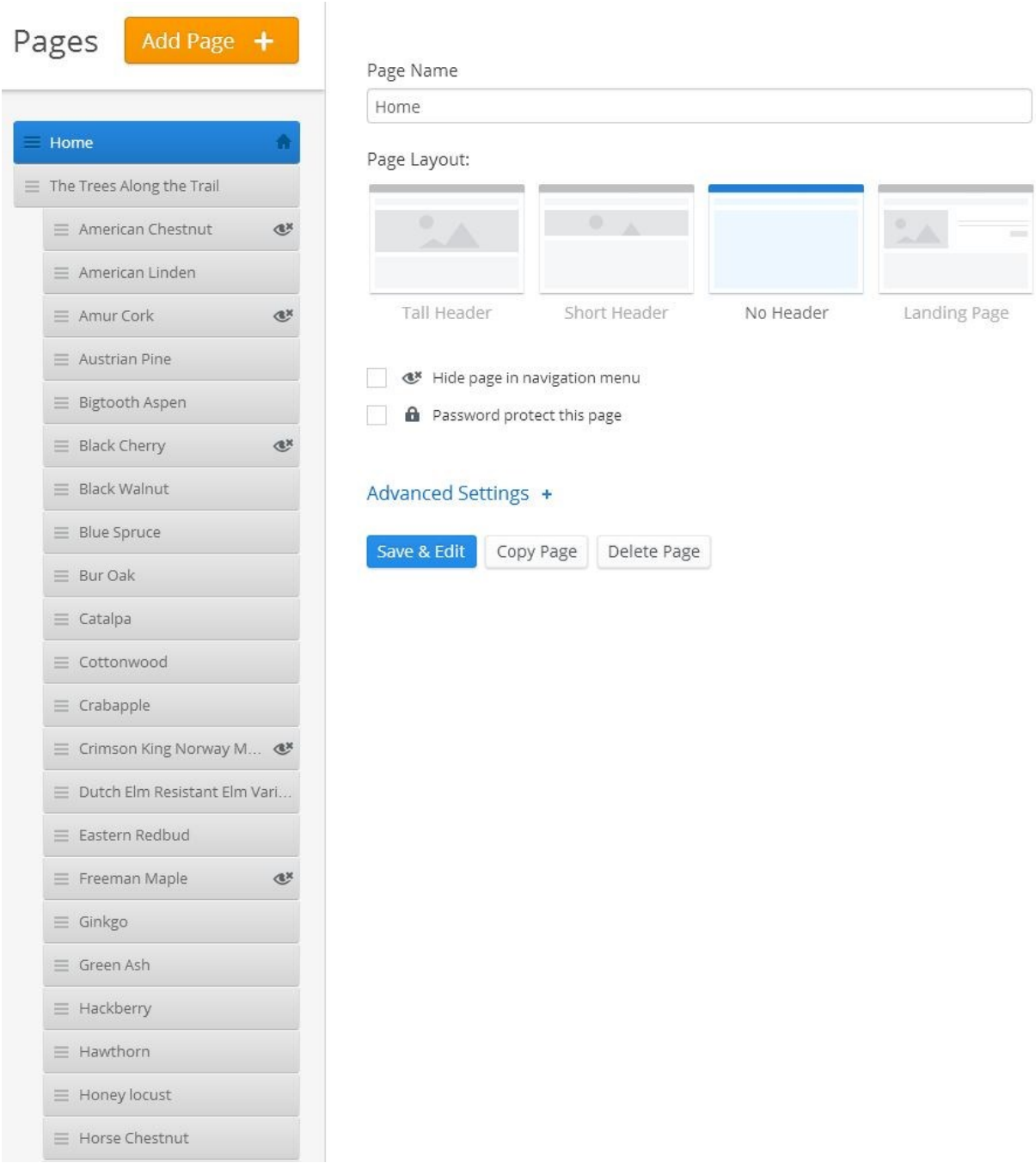
The Tree Trek is a guided tour, a path that leads the visitor through a park, stopping at each different tree species. At each tree station, there is a "post" with information about that specific tree species, information that includes: the tree's common name as well as its Latin name, the size of the tree at maturity, common traits that the tree exhibits, as well as some common problems often associated with the tree. Along with the information there is also a QR Code that links to a FAQ page for that species of tree. Using any smart device with QR code reading capability allows the user to find more information about the tree they are standing next to. If you are unfamiliar with what a QR code is, it is like a barcode that is found on many of the products you purchase but unlike a bar code it can direct a smart device such as an iPhone or any Android phone to a specific website. Some of these phones may need to have a QR code reader application installed on them before this will work, but once it is installed the user is then directed to the website. Here is one to try out if you are unfamiliar with this technology. After reading up on the current tree you can move along to the next tree.

This project was created as a way of introducing park users to trees in the park, providing them with some useful information while offering a new park activity. Hopefully this will also bring new users to the parks that may not have been inclined to use the traditional amenities that are present. Like all things in life, there is some work that needs to go into a project like this. The posts need to be installed near the trees and there will need to be some fashion of signage on the posts (Image 1). For the Mounds Park Tree Trek, we used flat fiberglass posts with custom-printed stickers as signage. These worked well since the posts were 4 inches wide as well as the pre-printed stickers that were affixed directly to the posts. Since no one was in favor of attaching signage to the trees, this was found to be a perfect solution to that problem.

Posts like these can be purchased from online retailers at around $20.00 a piece and the stickers can be printed at one of many office supply stores for around $10.00 per sticker. The stickers are weather-resistant and should last for at least 3 years, if not longer.

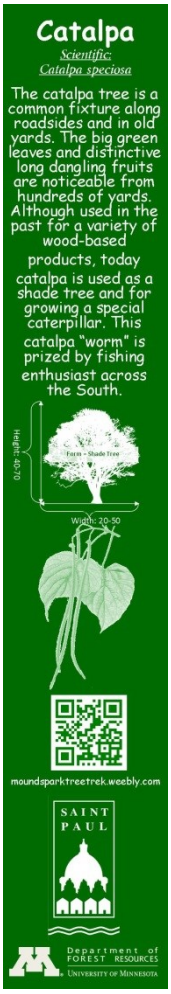


There is also the task of building a website that can host all of your tree information. Luckily there are free website building websites, such as Weebly.co that help you build your site and host it as well (Image 2). This may sound daunting but it is a straightforward process and very user-friendly. The website you create can be set up a number of ways. The format that was used in the Mounds Park Tree Trek was to use heading pages and within those pages, adding content pages as necessary. Here is an example of what the build page will look like (Image 3).



Once your tree's page is completed, you can take the URL to a QR code generator such as, https://www.the-qrcode-generator.com. This will convert the URL into a QR code that can be put on the sticker that will be affixed to the sign.

Creating the signage or the graphics to be used for the stickers can be done many ways. We found that using Microsoft Office Publisher was the easiest. Using this program allowed for the size of the signage to be set at 4" x 18"; since the posts were 4.5" wide, this was the size that was desirable. Since the size of your posts may be larger or smaller, play around with the format that works for you. Here is an example of one of the signs we created (Image 4).



The final stage is to install the signs. Using a specialized post pounder for these flat posts, we were able to position the signs just inside the mulch ring. This ended up being 3' from the trunk of the trees. Some trees may have a larger root flare or exposed roots that will make installation this close to the tree hard to accomplish. In this case, it may be advisable to move the sign out to the point where there is no obstruction from the root system. The goal is not for the posts to be placed in perfect symmetry with the trees but rather to be useable by the park patrons for years to come.

This is a relatively new program so there are questions pertaining to the durability of these posts and stickers as they come up against the elements, vandalism and weed whips. Unfortunately, this question of durability can only be answered as time goes on and the program matures.

If this program sounds like something that your community would like to look into further, we are happy to answer any questions and offer technical advice. Please feel free to contact Dustin Ellis at ellis554@umn.ed with any questions that you may have.


SAINT PAUL PARKS & RECREATION

Olson Memorial Highway Elm Evaluation Study

Minneapolis, MN – (2007 – 2012)

Jonathan W. Fillmore – Department of Forest Resources

Chad P. Giblin – Department of Forest Resources

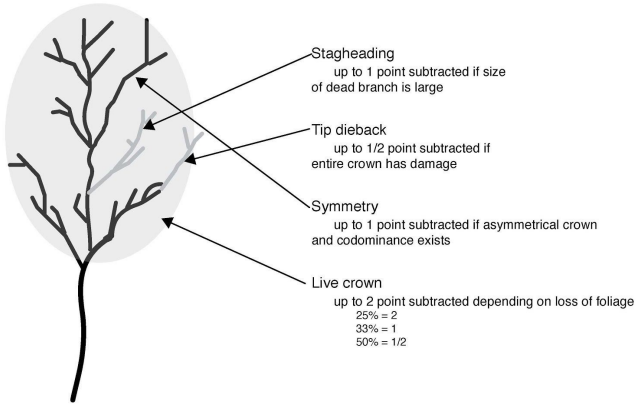
University of Minnesota, Saint Paul, MN 55108

The Olson Memorial Highway (OMH) elm evaluation study is a cooperative study between the Minneapolis Park and Recreation Board and the University of Minnesota, Department of Forest Resources. The study was designed to test lesser known Dutch elm disease (DED) resistant elm varieties. At the time of planting, there was little performance information on different DED resistant elm varieties for the Twin Cities.

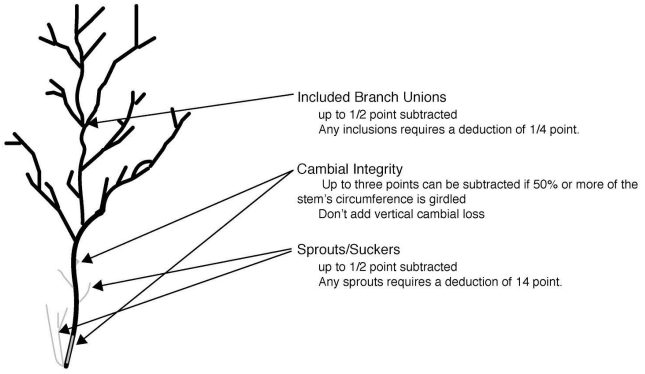
The study area spans the median of Olson Memorial Highway from the Van White Memorial Boulevard to Thomas Avenue North. The site was planted using 2 in. balled and burlapped (B&B) trees in 2003. Annual developmental pruning was performed for three years before data was collected.

The varieties that were included in the study were Accolade, Cathedral, Danada Charm, Discovery, New Horizon, Pioneer, Princeton, Triumph, and Vanguard. In 2007, 2008, 2010, 2011, and 2012, condition ratings and caliper data were collected. The condition rating system assigns a numeric value 0 - 4 with 0 being dead, and 4 being no obvious defects for both stem and canopy.

Condition rating system: canopy

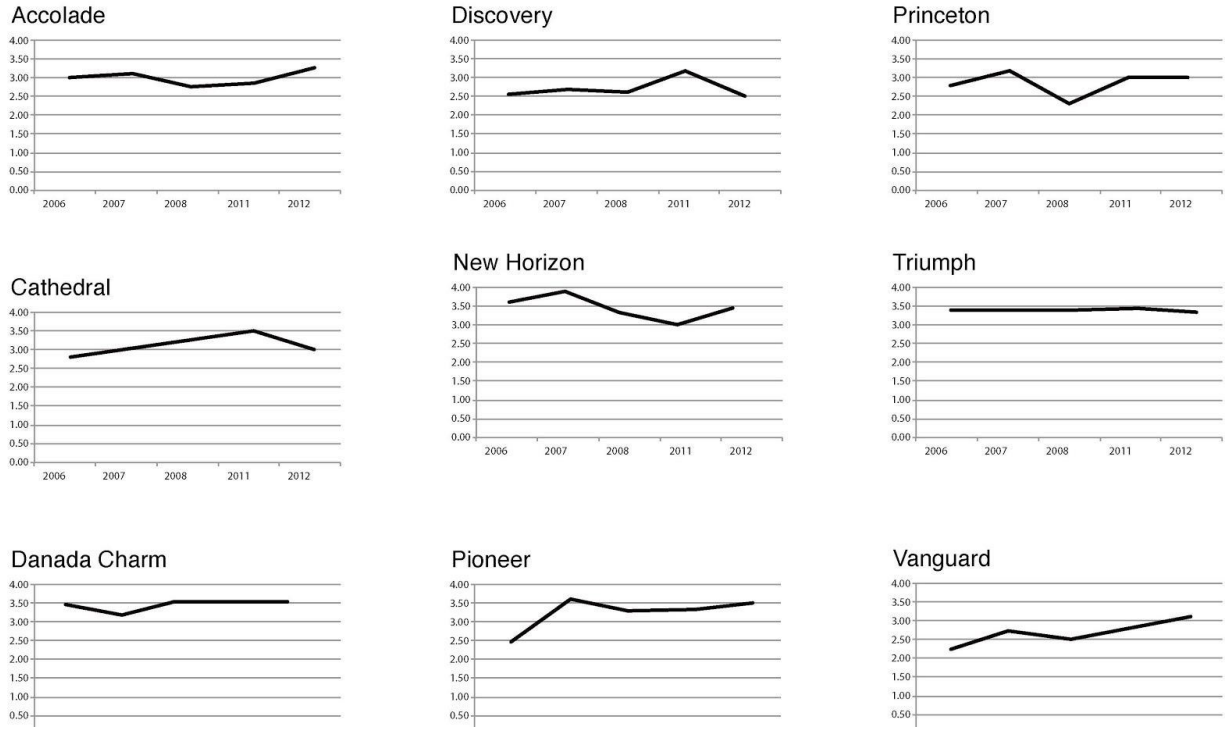


Condition rating system: stem



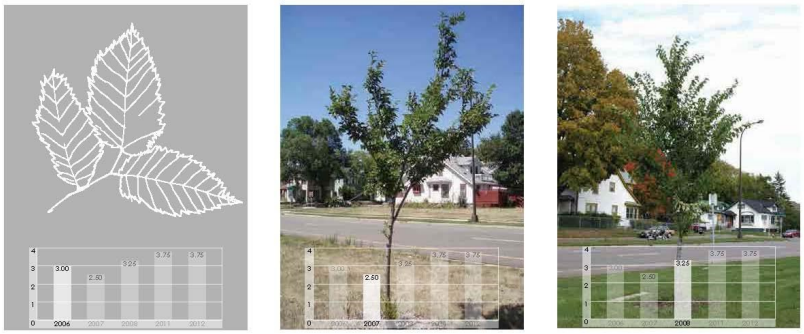
The elm varieties in the OMH evaluation study that performed best were Danada Charm, Accolade, and Triumph. These varieties showed the most steady condition rating over time, meaning the tree kept good overall form and integrity with the least amount of developmental pruning. The second top three performers were Princeton, Discovery, and New Horizon. These trees still performed well but the condition rating varied more from year to year alluding that heavy pruning was needed to correct defects. The bottom three performers were Pioneer, Vanguard, and Cathedral. These trees started with poor form and gradually improved with regular pruning. See next page for line graphs of condition ratings. Department of Forest Resources staff will continue to collect data on five year cycles to gain further knowledge on how the varieties perform over time.

Condition ratings



Below is a time lapse of Triumph that shows condition ratings over a picture of the tree

Exemplary example: Triumph



Exemplary example: Triumph

MPRB-City of Minneapolis Biochar Amendment Research Project

Minneapolis, MN - (2014 – 2019)

Rachel E. Kranz – Department of Forest Resources/University of Wisconsin-Madison

Introduction

Throughout the City of Minneapolis, there has been an increase in young trees planted in boulevards in recent years. The research of soil amendments which can be incorporated into preexisting soil as a potential method of improving planting practices and reducing mortality by increasing initial tree establishment and success is of particular interest.

What is biochar and why would we use it?

Biochar is a carbon-rich byproduct of organic materials (such as wood waste) burned at a high temperature in a closed container without the presence of oxygen. The biochar used for this project was produced from sawmill waste and processed in Missouri. After arriving in Minnesota, the biochar was blended with composted manure at a rate of 1:5 at a facility operated by the Shakopee Mdewakanton Sioux Community.

Biochar has been shown to improve physical and chemical characteristics of soil such as nutrient availability and retention as well as water-holding capacity which could increase water availability. In an Illinois study conducted by Scharenbroch and associates, *Acer saccharum* (sugar maple) and *Gleditsia triacanthos* (honey locust) were used to test four organic mulches, including biochar, in urban areas with poor soil quality. This study found that biochar treated trees had a greater biomass (increased 44%) across both tree species compared to the control group and also had the greatest impacts on tree growth and soil quality. The Minnesota study hopes to achieve similar results - that these organic materials will increase the health and success of urban trees and can be used more frequently in the future.

This project will examine the effects of two rates (22qt and 44qt) of both composted organic matter and biochar amendments when incorporated into the preexisting soil at a tree planting location. Treatments were randomly assigned to 600 public boulevard trees in the City of Minneapolis. Eleven tree species were used in the study including:

Scientific Name	Size	Type		Nursery
Gymnocladus dioicus 'Espresso'	1.75"	Bareroot		Schichtel's Nursery, Inc.
Malus 'Prairifire'	1.75"	Bareroot		Schichtel's Nursery, Inc.
Platanus x acerifolia 'Bloodgood'	1.5"	Bareroot		Gerten Greenhouse & Garden Center
Quercus bicolor	1.75"	Bareroot		Hoffman & McNamara Co.
Syringa reticulata 'Ivory Silk'	1.75"	Bareroot		Schichtel's Nursery, Inc.
Tilia cordata 'Glenleven'	1.75"	Bareroot		Mckay Nursery
Ulmus americana 'Princeton'	1.75"	Bareroot		Klaus Nurseries
Ulmus americana 'Valley Forge'	1.75"	Bareroot		Klaus Nurseries
Ulmus 'Morton'	1.75"	Bareroot		Hoffman & McNamara Co.
Ulmus 'Morton Glossy'	1.75"	Bareroot		Wilson's Nursery Inc.
Ulmus 'Patriot'	1.75"	Bareroot		Klaus Nurseries

During the first year of data collection (Summer 2014), tree stem caliper was taken at 15cm and 30cm along with an initial rating of overall appearance and quality. Every tree will be revisited after three and five years for measures of mortality, stem caliper increases, and stem and crown condition ratings.

MPRB Precision Organics Test Product Research Project

Minneapolis, MN - (2014 – 2019)

Rachel E. Kranz – Department of Forest Resources/University of Wisconsin-Madison

The recent increase in young trees planted in public boulevards in Minneapolis has sparked an interest in the research of soil amendments which can be incorporated into preexisting soil at planting. The product tested in this study is manufactured to have a carbon to nitrogen ratio (C:N) of 20:1. Similar C:N ratios, used in other products and in previous trials, is suspected to have reduced mortality by increasing initial tree establishment and success through enhanced water retention and availability and by increasing soil biological activity and nutrient availability.

This project will examine the effects of a Precision Organics Test Product (POTP) when incorporated into the preexisting soil at planting time. POTP was incorporated at two rates - full rate (½ bag) and half rate (¼ bag) and randomly assigned to public boulevard trees in the City of Minneapolis. Ten tree species were used in this study with each species replicated eight times for each POTP treatment as well as untreated controls, resulting in a total of 240 study trees.

Scientific Name	Size	Type	Nursery
Gymnocladus dioicus 'Espresso'	1.75"	Bareroot	Schichtel's Nursery, Inc.
Malus 'Prairifire'	1.75"	Bareroot	Schichtel's Nursery, Inc.
Platanus x *acerifolia* 'Bloodgood'	1.75"	Bareroot	Gerten Greenhouse & Garden Center
Quercus bicolor	1.75"	Bareroot	Hoffman & McNamara Co.
Syringa reticulata 'Ivory Silk'	1.75"	Bareroot	Schichtel's Nursery, Inc.
Tilia cordata 'Glenleven'	1.75"	Bareroot	Mckay Nursery
Ulmus americana 'Princeton'	1.75"	Bareroot	Klaus Nurseries
Ulmus americana 'Valley Forge'	1.75"	Bareroot	Klaus Nurseries
Ulmus 'Morton'	1.75"	Bareroot	Hoffman & McNamara Co.
Ulmus 'Patriot'	1.75"	Bareroot	Klaus Nurseries

During the first year of data collection (Summer 2014), tree stem caliper was taken at 15cm and 30cm along with an initial rating of overall appearance and quality.

Figure 1. Incorporating the amendment into back-fill soil at planting time.

Effects of Street Reconstruction on Boulevard Trees in the Kenwood Neighborhood of Minneapolis, MN: 20 Years of Information

Ryan L. Murphy – Department of Forest Resources

Project History

From 1993-1994 Minneapolis Public Works initiated an extensive infrastructure update in the Kenwood neighborhood. This included structural renovations of hard surfaces such as roads, curbs, sidewalks and carriage walks; new utility installations (water, sewer, electric and gas); and also re-grading the boulevards (area between sidewalk and city street).

This also marked an important step in the collaboration between Minneapolis Public Works and the Minneapolis Park and Recreation Board (MPRB) as it was the first time a collaboration of any kind was undertaken. It was agreed upon that the MPRB would conduct a monitoring study on the effect of reconstruction activities on the existing boulevard trees. Gary Johnson of the University of Minnesota was brought onto the project to set-up and run the study.

Two experimental groups were established – one group was made up of trees located on the blocks that received the infrastructure renovations. This area was bounded by Kenwood Parkway on the west, Douglas Ave on the south, Emerson Ave S. on the east and Mount Curve Ave on the North. The control group (no reconstruction activities) area of the study was bounded by Knox Ave S. on the west, Summit Ave on the South, Colfax Ave S. on the east, and Douglas Ave on the north.

Trees from five different genera were selected to be part of the study: *Acer, Fraxinus, Ulmus, Celtis,* and *Tilia*. These genera were represented by one or more species, which for the purposes of this study were lumped together and grouped by genus.

Number of Trees	Control	Reconstruction	Species Total
Fraxnius	40	51	**91**
Ulmus	41	63	**104**
Celtis	0	54	**54**
Tilia	36	56	**92**
Acer	34	60	**94**
Combined Totals	**151**	**284**	**435**

Methods

In total there were 435 trees (151 in control group and 284 in reconstruction group) included in the study across the five genera. Because of insufficient numbers of *Celtis occidentalis* in the control block segments, only a reconstruction treatment group exists for this genus. All other genera are represented in both the control and reconstruction groups.

Initial tree identification and diameter at breast height (DBH) measurements were taken in the spring of 1994. Each tree received an individual identification number that was used to track it throughout the course of the study. DBH was again gathered in 1999, five years after initial reconstruction. Condition ratings were also gathered in 1999 for the first time (see below). Final DBH and condition ratings were gathered in the late fall

of 2013. Tree removal was recorded in 1999 and 2013 (specific individual removal causes are not known at this time and are simply summed as lost trees).

Diameter at breast height (DBH): This is an assessment of tree trunk diameter. DBH readings were taken approximately 4.5 feet off of the ground using either a DBH tape or Biltmore Stick.

Condition Ratings: This is a system used to visually assess the overall health of a tree. This study collected condition ratings for stem and canopy individually. A rating is assessed on a scale from 0-3. Each tree starts with a perfect score of 1 for both stem and canopy. Points are added to the scores for perceived defects. For example, a stem with a large canker with cambium decay may receive a score of 2. A score of 3 is consid-

Discussion

This study undertook the challenge of assessing effects of urban infrastructure reconstruction on boulevard trees over the course of 20 years. Effects of reconstruction on boulevard trees may not be apparent in the short run and so it is beneficial to follow-up years after the reconstruction takes place.

The *Tilia* genus faired best in terms of longtime survival and growth, showing the fewest removals and greatest average increase in DBH - conversely, the *Ulmus* genus faired poorest among the genera with the most removals and lowest average increase in DBH. This is not overly surprising considering pressure from Dutch elm disease on elm removals; furthermore, the *Ulmus* trees in this study were far larger at the outset compared with other genera.

Both *Fraxinus* and *Tilia* genera had more removals in control groups compared to reconstruction groups while *Ulmus* and *Acer* both showed a greater percentage of removals in the reconstruction group after 20 years. The majority of the removals occurred between years 5 and 20 of the study. For example, *Ulmus* experienced only around 8% removal in the reconstruction group within the first five years, but after 20 years 57% of trees on reconstruction blocks from the genus had been removed.

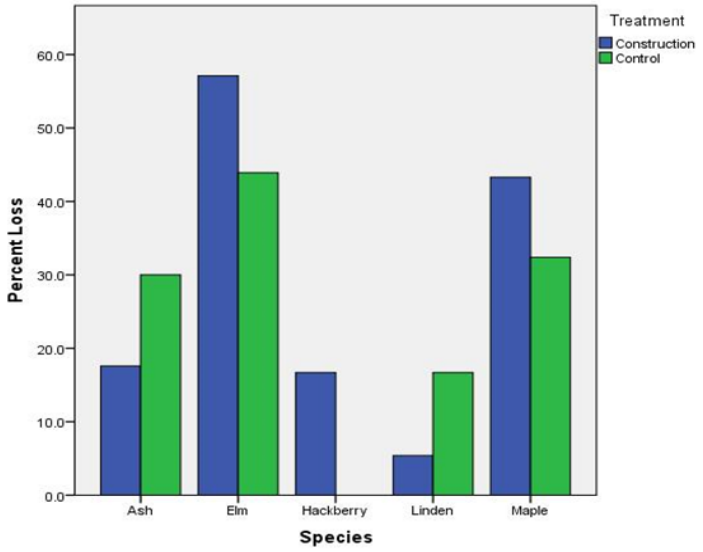
Although within genus comparisons between reconstruction and control groups were not highly significant, there was a significant difference in how each genus compared to the other genera in terms of removals after 20 years. Interestingly, based on the data, trees were more likely to survive in the reconstruction verses the control group after five years (p-value 0.0758).

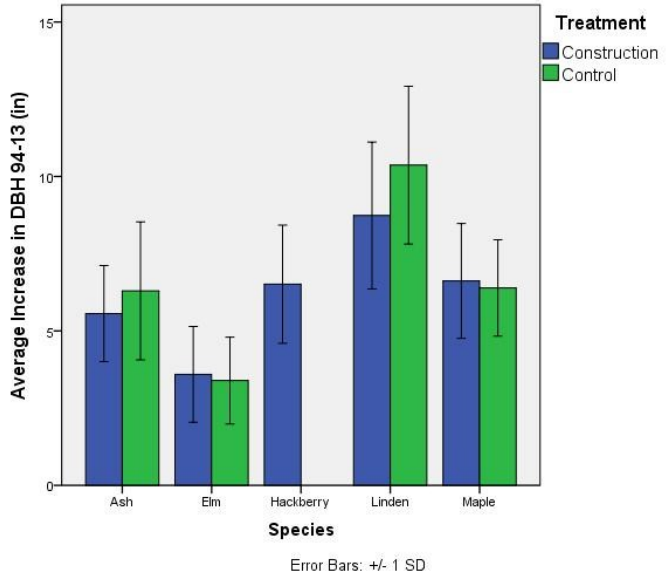
Results

Tree Removal

Tree removal was summed from 1994-1999, 1999-2013, and 1994-2013. Tree loss was not significant over the first five years. *Fraxius* and *Ulmus* genera both lost four trees in the reconstruction group and five trees in the control group. *Tilia* lost no trees on construction blocks and two trees on control blocks. *Acer* genus lost six trees in reconstruction blocks and five in control.

Tree removal increased greatest for *Ulmus* and *Acer* genera between 1999 and 2013. Losses for *Ulmus* were 43.9% in control group and 57.1% in the reconstruction group. The *Ulmus* genus had the most removals amongst all genera and treatments. Losses for *Acer* were 32.4% for control trees and 43.3% for reconstruction for trees. Both *Fraxinus* and *Tilia* showed greater losses in the control blocks than on construction blocks. *Celtis* lost a similar percentage of trees as *Fraxius* in the reconstruction group - 16.7% and 17.6% respectively. Overall, *Tilia* had the lowest percentage of removals compared to all other genera (16.7% for control and 5.4% for reconstruction





Diameter at Breast Height (DBH)

Mean change in DBH was calculated from 1994 – 2013 for each genera by treatment. Both *Fraxinus* and *Tilia* control treatment groups showed slightly greater average increases in DBH from 1994-2013 over reconstruction groups. Both *Ulmus* and *Acer* groups had slightly greater average DBH increases in the reconstruction treatment group over the control group. *Tilia* showed greatest growth in both control and reconstruction groups amongst all genera.

Average DBH increase across all genera reveals that when lumped together control treatment trees had a slightly greater increase (.414 in) in DBH than the reconstruction treatment trees. Ranges of DBH increases within all groups and treatments were quite large.

Mean DBH Increase (in) 94-13	Control	Reconstruction
Fraxinus	6.11	5.46
Ulmus	3.25	3.4
Celtis	0	6.37
Tilia	10.21	8.56
Acer	6.3	6.48
Mean Across All Genera	**6.4675**	**6.054**

Condition Ratings

Average condition ratings were computed for both 1999 and 2013. Each year has a separate average condition rating for canopy and stem for each treatment per genera. There was only one instance in which the average condition rating for a control treatment group was higher (worse) than the corresponding reconstruction treatment group - the 1999 stem condition rating for linden. Based on these numbers it would appear that the condition of the trees is getting better. This, however, may also be due to the fact that different persons were making the assessments between the 1999 and 2013 condition ratings (i.e. one grader is less harsh than another).

Species	Stem 1999 Construction	Stem 1999 Control	Canopy 1999 Construction	Canopy 1999 Control	Stem 2013 Construction	Stem 2013 Control	Canopy 2013 Construction	Canopy 2013 Control
Fraxinus	1.59	1.16	1.55	1.46	1.28	1.06	1.34	1.125
Ulmus	1.5	1.16	1.54	1.37	1.3	1.05	1.51	1.34
Celtis	1.14		1.18		1.04		1.15	
Tilia	1.29	1.31	1.21	1.11	1.18	1.09	1.19	1.11
Acer	1.32	1.25	1.22	1.07	1.4	1.21	1.28	1.08

Average Condition Ratings


1743

Using Trunk D.B.H.* to Predict Trunk Flare Diameter at Ground Line

Eric North. Research Fellow. Department of Forest Resources, UMN.

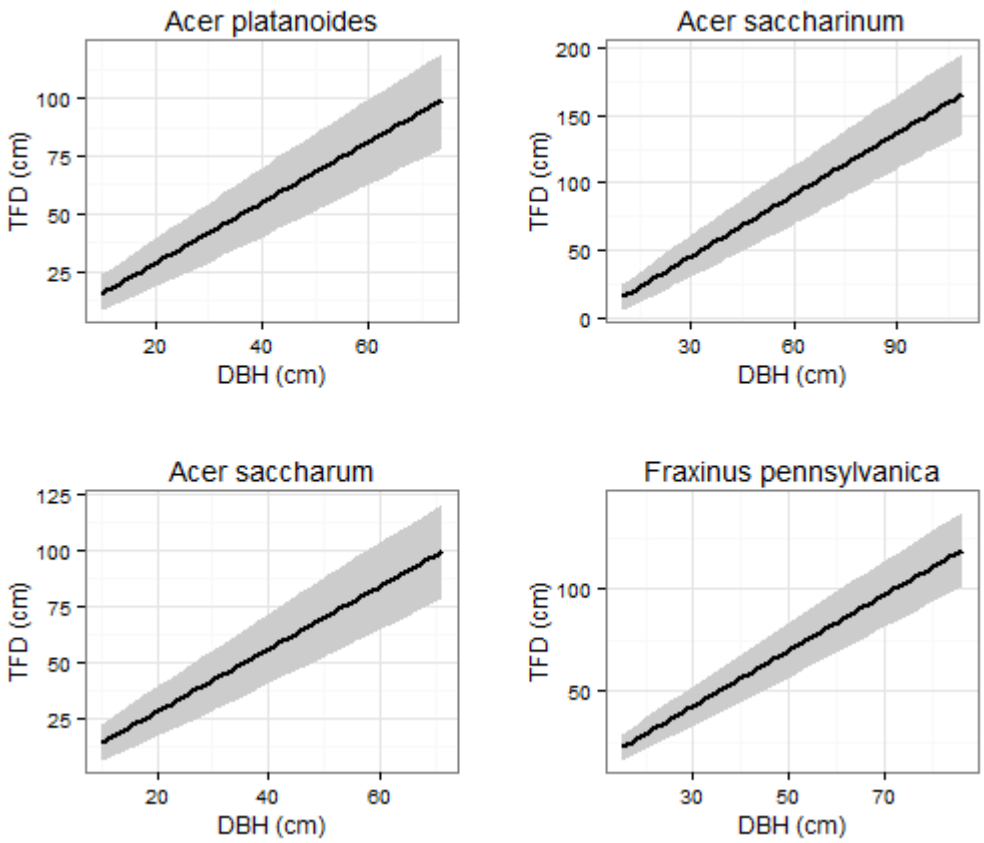
In 2013-2014 models that predict tree crown width for street trees common to Minnesota (maples and ash) were completed with the help of volunteer collected urban tree inventories. Tree crown width models are currently used to estimate the benefits provided by urban streets. The tree crown width models were designed to serve as statewide models capable of providing estimates with a level of accuracy able to serve as the basis for planning and management objectives. The first objective of this study was to create a methodology for improved measurements of crown width and, using those measurements, create models for use by urban communities throughout Minnesota.

The second objective of this study was to establish a technique for the measurement of trunk flare diameter at ground line and to create predictive models of trunk flare diameter. Urban trees and urban infrastructure, specifically sidewalks, often come into contact causing conflicts that can be hazardous to citizens and costly to remedy. Trunk flare at ground line and the roots that originate from the trunk flare are part of the conflicts between trees and urban infrastructure. Both crown width and trunk flare diameter predictive models can be used by urban communities throughout Minnesota for improved planning and management of their urban forests. A web-based calculator was created, as well as a custom Microsoft Excel spread for easy calculation of crown width and trunk flare dimensions. Results of this research were presented at the Minnesota Shade Tree Advisory Committee (MnSTAC) monthly forum, the Minnesota Shade Tree Short Course annual conference, and the International Society of Arboriculture annual conference.

Figure 1. Trunk Flare Diameter at ground line. Mature silver maple (*Acer saccharinum*)

*D.B.H. The diameter of the tree trunk measured at a distance of 4.5 feet (1.4 m.) above ground.

Figure 2. Prediction intervals for TFD plotted on DBH



New research has also been started to assess the resilience of urban trees. Field data is currently be collected to assess the ability of urban trees to provided continued benefits to residents living in growing Minnesota cities. Changing climate and urban construction activities have an effect on urban trees. This new research aims to answer what impact climate change in combination with construction damage has on an urban tree's ability to provide continued environmental benefits (e.g. storm-water runoff mitigation and pollution interception), economic benefits, and benefits to human health.

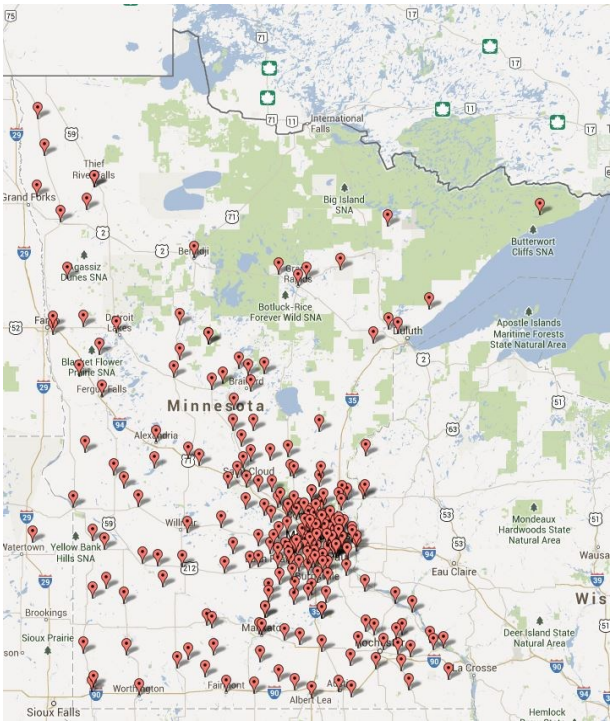
While research is important to advance our understanding of urban forests, education and community outreach cannot be forgotten. Over the course of 2014 training in arboriculture, urban forest inventory, tree identification, and community engagement was provided to volunteer, para-professionals, and professional involved in urban tree care. Groups served included: Minnesota Tree Care Advocates, Minnesota Tree Inspector Programs, Rochester Arborist Workshop, Tree Trust, and the Minnesota Green Corp Urban Forestry Members. Combining outreach, education, and research has proven to be a successful means of practical tools for urban forestry managers, but also increase public awareness and understanding of the role urban forests play in creating sustainable, livable communities.

Minnesota Tree Inspector Program - Reporting Period: Aug. 2013-Aug. 2014

Minnesota Certified Tree Inspector Program Overview:

As of August 2014 Certified Tree Inspectors are serving 249 Minn. Communities in 79 out of 87 Minnesota counties, with an additional 10 communities being served in Wisconsin and North and South Dakota (Oct. 2013 Minnesota Disbursement map, right). This report was assembled using one full year of gathered from August 2013 through August 2014. Any "Missing" 2014 data is due to the program year not having been concluded.

2014 Minnesota Tree Inspectors Statewide Distribution Map



Record Setting Growth:

This 2013-2014 reporting period saw record setting attendance for both the annual "Fall Community Forestry Workshop" series, the preferred recertification option for Tree Inspectors in rural Minnesota and the "New Tree Inspector Training Workshops". The two annual "New Tree Inspector Workshops" held on Feb. 26 and May 6, 2014 exceeded the previous attendance record of 2013 (see below). This was likely due to expanding marketing lists (electronic and physical) and narrowing the focus of both electronic and our targeted mail marketing campaigns. Also, further cultivation of relationships of "key stakeholders" in the tree care community both public (state, county and city agency) and private sectors (nursery, landscape etc.) as partners in promotion of these educational offerings.

2014 Tree Inspector New Certification Workshops Overview:

These two (2) workshops are the primary means of entry of "new" Inspectors into the Minnesota Tree Inspector Program. They are held at T.I.E.S. Education Center in St. Paul.

New Tree Inspector Workshop by Year	# of Attendees	# of Attendees	# of Attendees
	Jan/Feb	May	Total
2009	34	46	79
2010	39	54	93
2011	35	34	69
2012	32	27	59
2013	33	60	93
2014	39	58	97

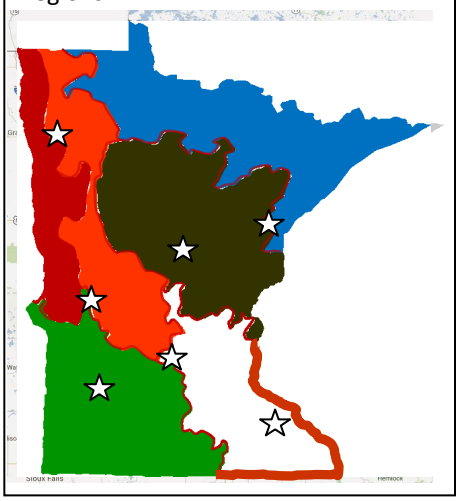
2014 Fall Community Forestry Workshops:

Themed "Tree Diagnostics: Tools YOU Can Use", these workshops will be held throughout September in 6 Minnesota communities. Communities were chosen to represent the 6 diverse biological regions of the state and by proximity to University campuses, extension resources as well as to offer ease of access to "target audience". These annual workshops are the preferred method of Tree Inspector recertification by Inspectors living outside the Metro area.

The 2014 workshop dates and locations are as follows:

- Fri. Sept. 5, Lamberton
- Mon. Sept. 8, Brainerd
- Mon. Sept. 15, Morris
- Fri. Sept. 19, Waseca
- Mon. Sept. 22, Crookston
- Mon. Sept. 29, Hutchinson

Map: 2014 Fall Tree Inspector Workshops Locations in the 6 Minn. Bio-regions.



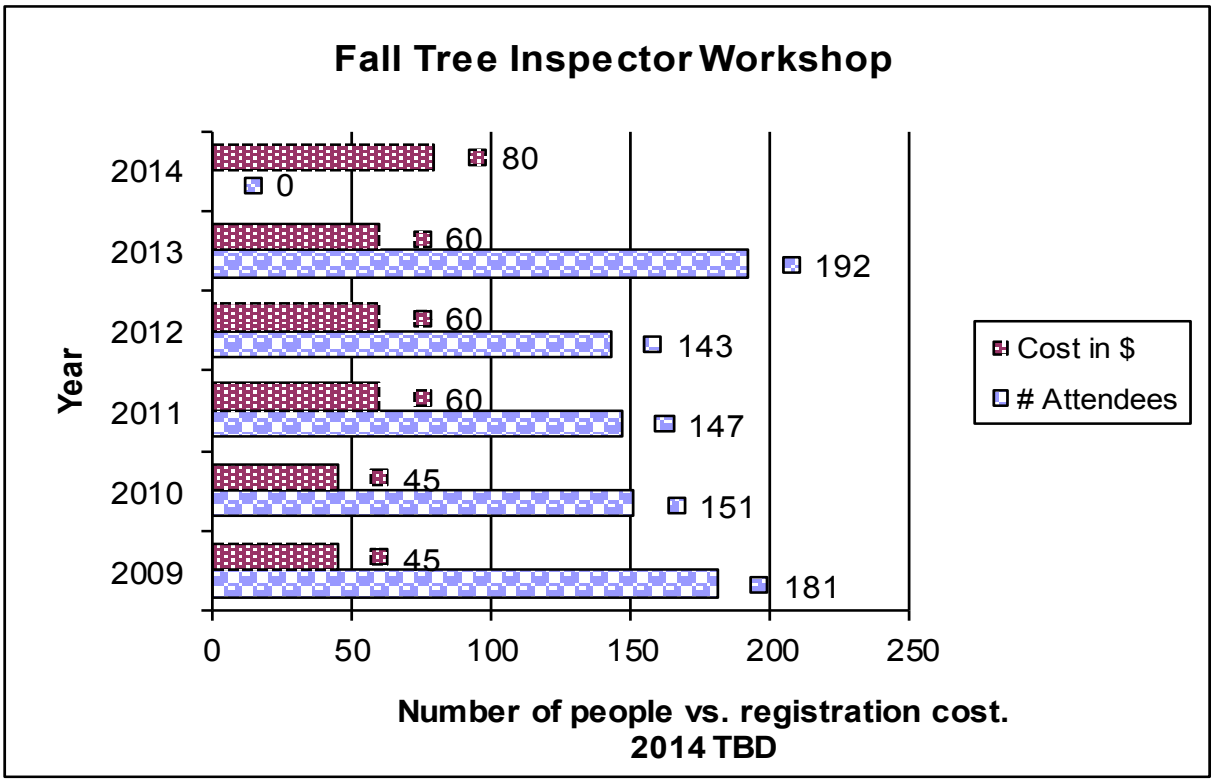
2013 FALL WORKSHOP SERIES: Detailed Statistics the 2014 Workshops were not yet completed at the time of this report. Information below is based on the Completed 2013 Fall Workshop data. It's included to be a representation of typical attendance and when combined with previous years data, to help identify and reflect trends.

In 2013 the Minnesota Tree Inspector Program offered a total of six "Fall Forestry Workshops". Also, the "Northeast Community Forestry Workshop" was reintroduced. The latter was last held in 2008. It was resurrected in an effort to help foster the relationship with the Coquet Forestry Center and Cloquet U of M Extension as a "gateway" to the underserved Northeast region. In 2013 N.E.F.W.S. was well attended and this workshop will continue to be offered annually for as long as there remains interest.

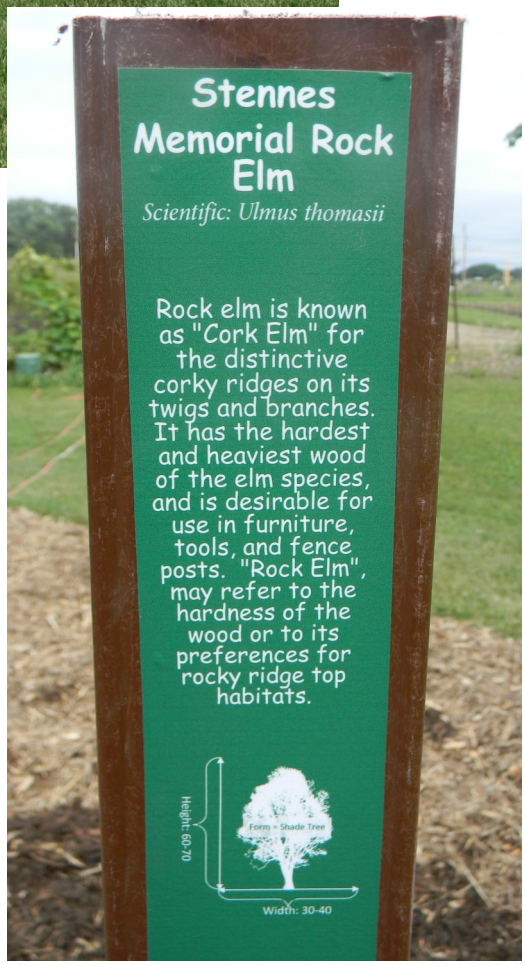
Overview of 2013 Fall Workshop Series

- Overall attendance numbers were the highest on record.
- **Recertifications** obtained through the workshops are up substantially (20-25%) from 2011 and 2012 congruent with higher attendance numbers.
- ISA ceu offerings are being increasingly taken advantage of through these workshops with 17 of 192 participants seeking c.e.u.'s in 2013 for a total of 85 ISA c.e.u.'s given through Tree Inspector workshop offerings.

Graphic representations of attendance data for reporting period Aug. 2013 through Aug. 2014. NOT included are the "2014 Fall Community Forestry Workshops" which take place throughout Sept. 2014.



*CITY/REGION	DATE:	TREE INSPECTOR RECERT.	ISA CEU	OVERALL ATTENDANCE
BRAINERD	9-4-13	25	2	30
*HUTCHINSON	9-6-13	25	4	29+
CROOKSTON	9-9-13	27	O	38
*MARSHALL	9-13-13	N/A	N/A	N/A
ROCHESTER	9-16-13	23	3	31 +
MORRIS	9-18-13	19	6	29 +
Fall W.S. TOTALS:		119	15	157
N.E.F.W.S. CLOQUET	5-21-13	9	2	35
TOTALS ALL		128	17	192


Stennes
Memorial Rock
Elm
Scientific: Ulmus thomasii
Rock elm is known as "Cork Elm" for the distinctive corky ridges on its twigs and branches. It has the hardest and heaviest wood of the elm species, and is desirable for use in furniture, tools, and fence posts. "Rock Elm", may refer to the hardness of the wood or to its preferences for rocky ridge top habitats.
Height: 60-70
Form = Shade Tree
Width: 30-40

Tree Seed Germination Rates for Gravel in Pots Experiment

Sean Peterson, Department of Forest Resources

TREE SPECIES	SOURCE	MEDIA	% GERMINATION
Acer triflorum	MN	Soil	0.0
Quercus elipsoidalis	MN	Soil	60.0
Q. elipsoidalis	NY	Soil	25.0
Q. imbricaria	IA	Soil	5.0
Q. bicolor	NY	Soil	15.0
Q. bicolor	MN Como Park	Soil	70.0
Q. alba	MN	Soil	0.0
Q. alba	MN Dean Parkway, Mpls.	Soil	40.0
Q. macrocarpa	MN	Soil	60.0
Carya ovata	NY	Soil	0.0
C. cordiformis	MN	Soil	0.0
Carya glabra	MN	Soil	0.0
Corylus colurna	NY	Soil	17.0
Tilia mandshurica	NY	Soil	0.0
Aesculus hippocastanum	MN	Soil	0.0
Viburnum lantana	NY	Soil	0.0
Magnolia stellata	MN	Soil	0.0
Celtis occidentalis	NY	Soil	0.0

TREE SPECIES	SOURCE	MEDIA	% GERMINATION
Acer triflorum	MN	100% stone	17.0
Quercus elipsoidalis	MN	“	80.0
Q. elipsoidalis	NY	“	25.0
Q. imbricaria	IA	“	5.0
Q. bicolor	NY	“	25.0
Q. bicolor	MN Como Park	“	75.0
Q. alba	MN	“	0.0
Q. alba	MN Dean Parkway, Mpls.	“	70.0
Q. macrocarpa	MN	“	30.0
Carya ovata	NY	“	0.0
C. cordiformis	MN	“	0.0
C. glabra	MN	“	0.0
Corylus colurna	NY	“	17.0
Tilia mandshurica	NY	“	0.0
Aesculus hippocastanum	MN	“	0.0
Viburnum lantana	NY	“	0.0
Magnolia stellata	MN	“	0.0
Celtis occidentalis	NY	“	0.0

TREE SPECIES	SOURCE	MEDIA	% GERMINATION
Acer triflorum	MN	90% Stone: 10% Sand	0.0
Quercus elipsoidalis	MN	“	50.0
Q. elipsoidalis	NY	“	60.0
Q. imbricaria	IA	“	0.0
Q. bicolor	NY	“	25.0
Q. bicolor	MN Como Park	“	65.0
Q. alba	MN	“	0.0
Q. alba	MN Dean Parkway, Mpls.	“	20.0
Q. macrocarpa	MN	“	40.0
Carya ovata	NY	“	5.0
C. cordiformis	MN	“	0.0
C. glabra	MN	“	0.0
Corylus colurna	NY	“	25.0
Tilia mandshurica	NY	“	0.0
Aesculus hippocastanum	MN	“	0.0
Viburnum lantana	NY	“	0.0
Magnolia stellata	MN	“	0.0
Celtis occidentalis	NY	“	0.0

TREE SPECIES	SOURCE	MEDIA	% GERMINATION
Acer triflorum	MN	70% Stone: 30% Turface	0.0
Quercus elipsoidalis	MN	“	65.0
Q. elipsoidalis	NY	“	40.0
Q. imbricaria	IA	“	0.0
Q. bicolor	NY	“	15.0
Q. bicolor	MN Como Park	“	80.0
Q. alba	MN	“	0.0
Q. alba	MN Dean Parkway, Mpls.	“	50.0
Q. macrocarpa	MN	“	45.0
Carya ovata	NY	“	5.0
C. cordiformis	MN	“	0.0
C. glabra	MN	“	0.0
Corylus colurna	NY	“	17.0
Tilia mandshurica	NY	“	0.0
Aesculus hippocastanum	MN	“	0.0
Viburnum lantana	NY	“	0.0
Magnolia stellata	MN	“	0.0
Celtis occidentalis	NY	“	0.0

The Minnesota Tree Care Advocate Program

Valerie Price. Urban and Community Forestry Programs Coordinator. UMN Forest Resources

Tree Care Advisor

The Tree Care Advisor program trains and mentors citizen volunteers in urban and community forestry. Tree Care Advisors are trained in planting, pruning, plant selection, as well as a host of other activities that are involved in urban and community forestry. Each new core course permits twenty five new members every year that receive 36 hours of classroom and laboratory training and instruction. The next training is the spring of 2015 in Saint Paul.

Tree Care Advisors are required to accumulate 12 hours of education every three years to renew their commitment to the Tree Care Advisor program. Within those three years, out of those 12 hours they are required for update training, they will attend the Best Planting Practices workshops where they will gain more practice on box cutting, determining correct planting depths as well as other new techniques and technology. Best Planting Practices is offered as a hands-on class as well as a distance learning opportunity.

Citizen Pruner

Citizen Pruner is a program that works directly with a community to discover their pruning needs and how citizen volunteers can help fill them. The Citizen Pruner program is then unique to that community and trains volunteers in the art and science of pruning a tree, most commonly relegated to removing suckers and watersprouts and smaller branches that block sight lines on boulevards and park properties. Current Citizen Pruner communities include Rochester, Sherburne County, Shakopee, and St. Paul, for a total of nearly 60 Citizen Pruner volunteers.

Figure 1. Basswood suckers blocking the sight lines at a street intersection. Citizen Pruners remove the suckers in this instance.

Figure 2. Citizen Pruners at a community pruning project in Rochester, MN removing suckers from a maple tree in a public park.

Figure 3. One Rochester pruning project nearing completion.

For more information on these programs or to see how your community can get involved contact Valerie Price at price301@umn.edu or go to www.mntca.org

Tree Establishment Studies at the High Bridge Dog Park

Saint Paul, MN - (2012-2017)

Chad P. Giblin – Department of Forest Resources, University of Minnesota

Construction, development, and other human activities can create poor soil conditions which negatively impact young tree establishment and long-term success. Research that tests trees on extremely tough sites is important in suggesting species and varieties for use in urban and community forests. The history of use at the High Bridge – and its transformation from coal car rail yard – make it a perfect choice for this type of trial. The bottom line: trees that work well here will have a good chance of performing well elsewhere. This site is also being designed to take advantage of the views to downtown Saint Paul and the expansive long corridor that runs its length.

In the spring of 2012, Xcel Energy volunteers joined City of Saint Paul Forestry staff and University of Minnesota faculty, staff and students to plant 156 trees at the newly established High Bridge Dog Park underneath the Smith Avenue Bridge. Nine different species were planted using two different root types:

Species Used

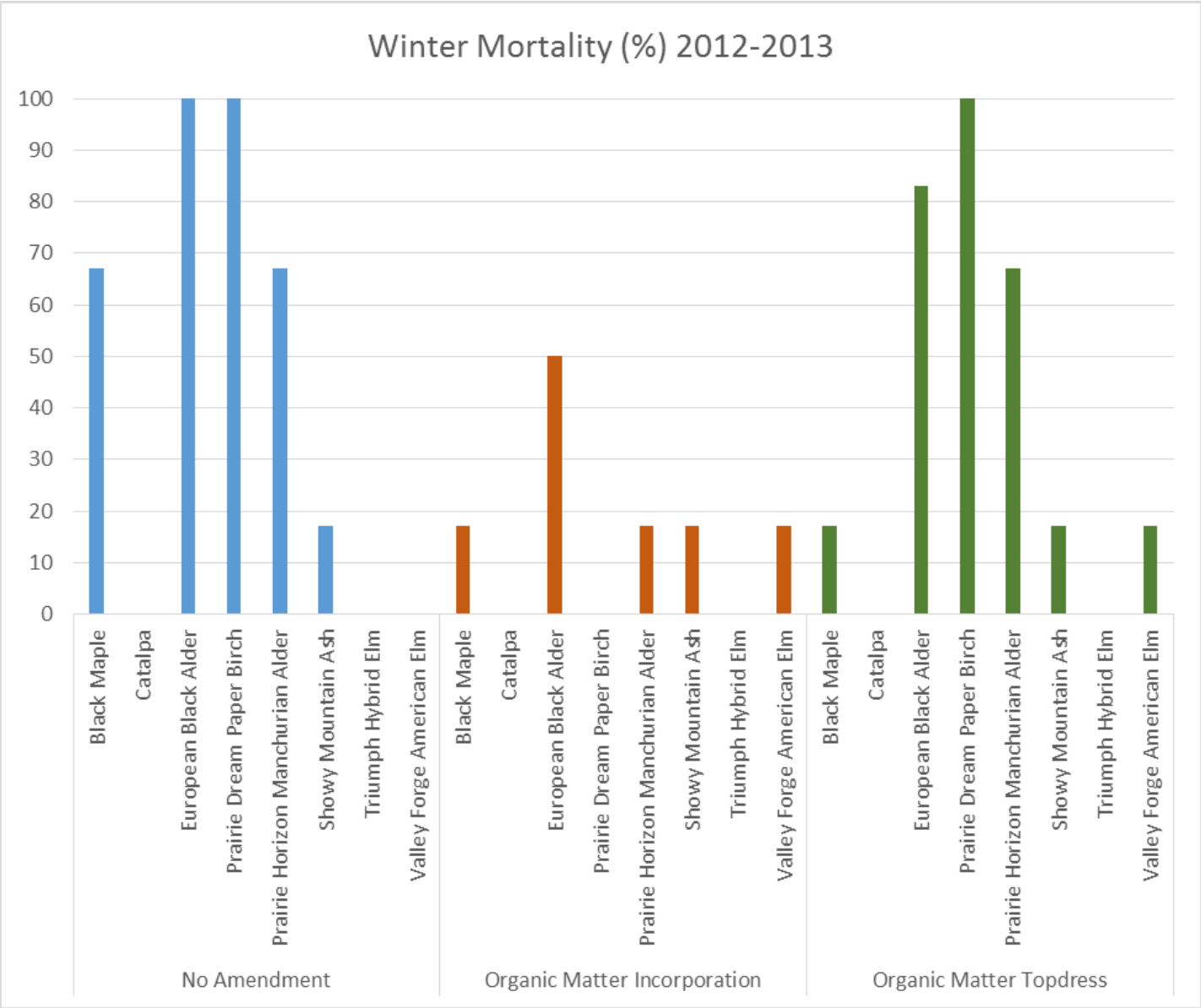
- Black Maple – RootTrapper Fabric Container
- Northern Catalpa – RootTrapper Fabric Container
- European Black Alder – Bareroot
- Prairie Dream Paper Birch – Bareroot
- Prairie Horizon Manchurian Alder – Bareroot
- Regal Prince Hybrid Oak – RootTrapper Fabric Container
- Showy Mountain Ash - Bareroot
- Triumph Hybrid Elm – RootTrapper Fabric Container
- Valley Forge American Elm - Bareroot

At planting, trees were treated with one of four different organic matter amendments. The organic matter was sourced from a Minnesota company which produces it from composted wood waste adjusted to a carbon to nitrogen ratio (C:N) of 20:1.

Amendment Treatments

- Topdressed – (36in x 2in) - All Species
- Incorporated – (1:1 by volume with existing soil) – All Species
- Topdressed + Incorporated - Regal Prince Only
- No Amendment - All Species

After a season severe drought the plagued most of Minnesota during 2012, this project experienced very high mortality during the first winter – about one-third of all trees were lost. Also, due to heavy browsing by rodents most of the Regal Prince oaks were completely or partially girdled during the first winter and were removed from any further analysis. Preliminary data suggests that the use of incorporated organic matter reduced first year winter mortality by nearly fifty percent (see chart below).



Additional trees were planted during Xcel Energy's Day of Caring in 2013 to explore the use of tree tubes and organic matter amendments on additional species. This planting was intended to fill some of the gaps created by winter losses during 2012-2013 and to complete the original vision of the park which included an area of tree tube trials.

<u>Tube Plantings - 2013</u>

- Bur Oak – Seedling Plug
- Kentucky Coffeetree – RootTrapper Fabric Container

- Northern Catalpa (MPRB Heritage Selection) – Seedling Plug
- Red Oak – Seedling Plug
- Espresso Kentucky Coffeetree (male)
- Quaking Aspen
- Yellowwood

Annual data collected includes stem caliper increase, stem and crown condition ratings. A full report of results will be released in 2018.