Idea for a Research Trial (Pilot Project) on the Survival and Growth of Different Sizes of Planting Stock for Street Trees in Halifax

Note #01 by Peter Duinker, February 2022

1_Background

A small research group led by me at the School for Resource and Environmental Studies, Dalhousie University, has been collaborating with HRM Urban Forestry since 2010 on urban-forest programming in the city. First, we helped develop the HRM Urban Forest Master Plan (https://www.halifax.ca/transportation/streets-sidewalks/urban-forestry) which Council unanimously endorsed in September 2012. Since 2013, each summer our group, comprised of me and 2-4 research assistants, undertakes a range of research projects on the HRM urban forest (for a listing, see this report: "Urban Forest Management and Research in Halifax, NS", which you can find at https://www.halifaxtreeproject.com/reports). Our main focus is collecting data on the survival, condition, and growth of newly planted street trees. The planting program during the past decade has ramped up from about a thousand trees per year to over three thousand per year.

As a researcher, I am constantly posing questions about how we do things in urban-forest management and then imagining what kind of research project we could do to shed light on specific questions. One aspect of street-tree planting about which I am inquisitive is why we plant trees that are so large at the time of planting. My scholarly and practical background is in silviculture, not arboriculture. In the woods, when we plant trees, they are seedlings. Sometimes they are potted stock no more than 20 cm tall, sometimes they are bareroot stock up to 50 cm tall. We never planted the typical balled-and-burlapped (B&B) stock that frequently is 300-400 cm tall.

Doubtless there are good reasons to plant larger stock. They are less prone to damage due to vandalism, mechanical damage from lawn-mowing equipment, and small mammals. They also give a sort of instant gratification in that, immediately, we have a tree taller than ourselves. However, they also have drawbacks. One is the time it takes for the planted tree to re-establish a healthy root-to-shoot ratio. When the tree is taken out of the ground at the nursery, the vast majority of its roots are left behind. If you tried to take all the roots, the root ball would be too large to handle. So, for several years in the new streetside environment, the planted tree allocates most of its growing resources into re-establishing a root system that matches the crown. This is highly stressful to the tree.

Another drawback in my view is the cost to plant a B&B tree. In HRM, that cost has risen from under $400 apiece about ten years ago to more like $600-700 apiece today. When seedlings are planted in the woods, they cost way less than one dollar each to plant. Part of the planting cost of large-stock trees in the streetscape is the purchase price of the tree - $200 apiece is not uncommon (and nowadays, they all come from large nurseries in Ontario because nobody grows B&B stock in Nova Scotia). The other part of the price is the labour and equipment cost. B&B stock is large and heavy so machines are needed to dig the hole and lift the tree off the truck and into the hole. When someone plants a seedling, all that is needed is a shovel.

I have heard it said that if you plant a seedling next to a B&B tree (of the same species) and they both survive in the streetscape, in ten to twenty years you would be hard-pressed to tell which was which. I would like to test that hypothesis with this study.

2_Study Design

What might a research trial look like in the streets of Halifax to inquire into the survival and growth of different sizes of planting stock? My proposal is to undertake a relatively small research trial on Lawrence St. This choice of street is based on the fact that I live on this street and therefore have immediate access to the new trees for protection, observation, and measurement. I estimate there to be about 35 plantable spots total along both sides of the entire street – this would be enough for a research trial of 24 new trees.

The physical plan would be as follows. We would plant 2 species x 4 stock sizes x 3 replicates of each (for 24 trees total). I am considering using red oak and red maple (or sugar maple). The stock sizes and rooting options would be:

- seedling, potted or bareroot
- 20-mm root-collar-diameter sapling, potted
- 40-mm root-collar-diameter sapling, potted
- 60-mm caliper stock, balled-and-burlapped

All the planted trees - to be installed in May/June - will be mulched to a 1-m diameter. B&B and 40-mm stock will be planted by HRM Urban Forestry staff and protected and tethered according to current HRM specifications. The other two sizes of stock would be planted by members of my research team and protected with 3 or 4 stakes (wood or T-bar) set around the seedling/sapling, perhaps 25-30 cm from the stem, for protection from lawn-mowing equipment and urinating dogs. The protection stakes should stick out of the ground by about 0.5 m. Seedlings will not be tethered, and the 20-mm stock might be, a judgement that can be made at the time of planting. Tethers would be removed after two years of service. Protection stakes would be left around the tree for probably five years or more. Specific sites for the different species and sizes would be allocated partly at random (I say "partly" because the seedlings should probably be planted in the most protected sites, such as between two large trees rather than adjacent to a driveway). Structural pruning would be undertaken by a professional with appropriate training.

All trees will be measured for dimensions, assessed for initial condition, located digitally, and photographed. Watering will be done by the Dal research team when needed during the first two years of growth (i.e. the planting year and the next one). All trees will be inspected monthly and corrections made to the stakes and tethering if warranted. Measurements and condition assessments will be made each year in September (end of the growing season, but before leaf fall). Careful records of direct and indirect costs will be made for planting and maintenance. Trees that die will be replaced as soon as possible. Detailed records will be kept on tree mortality and the likely causes.

3_Roles for Lawrence-St. Residents

My hope is that residents on our street will take enough interest in the project that they are motivated to learn more about trees in the streetscape. Residents are not able to assist in the planting of trees to be installed by HRM staff, but they may have interest to assist the Dal research team on the day that we plant the small stock.

I commit to informing residents about the project, and many topics related to urban forests, in two ways. I will put a special tab (called "Lawrence St.) on the Halifax Tree Project website (www.halifaxtreeproject.com) where information about the project will be available. Second, I offer to lead street-walks at any time when a group of residents, large or small, would like to observe the trees and discuss them with me.

4_Materials and Financial Costs

As part of the annual research partnership between my group at Dalhousie and HRM Urban Forestry, this project is a joint venture. HRM will supply all the planting stock and the installation services for the larger two sizes of stock. When supplies like mulch, stakes, and tethering wire are added in, I estimate the cost of the project to be about $3,000 (not inclusive of HRM staff time).

5_The Planting Event

The research plan calls for the larger stock to be planted first (by HRM staff). Then, the smaller trees (12 of them) will be planted in one day in late May or early June. That day will be well communicated with residents and the media. Residents and others are more than welcome to come out and observe. We will make a video of the event to be posted on our website.

6_Project Leadership

As a collaborative venture that is part of the research and monitoring partnership between my research team and HRM Urban Forestry, this project is led by senior people in the two groups. For the Dalhousie research team, I take responsibility for the project. My contact details are below. For HRM, leadership for the project is provided by Natalie Secen, Contracts Manager at HRM Urban Forestry (natalie.secen@halifax.ca).

7_Contact Information

Peter Duinker, PhD (resident of Lawrence St.)
Professor Emeritus
School for Resource and Environmental Studies, Dalhousie University
peter.duinker@dal.ca
www.dal.ca/faculty/management/sres/faculty-staff/our-faculty/peter-duinker.html

Co-Principal, Sylveritas Ltd.
pnduinker@gmail.com
phone: 902-229-5141
https://sylveritas.ca

Leader, Halifax Tree Project
www.halifaxtreeproject.com