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

Note #02 by Peter Duinker, June/July 2022

Implementation has proceeded! Here is an update, with details on methods.

Sites

From an initial first-approximation of the number of sites potentially available, numbering about 35, the utility locates brought that down to 27. On 20 June, I put an announcement in each home's mailbox announcing that we would put a tree in the tree lawn in front of the home on 25 June. By 24 June, five people registered an objection to having a new tree in front of their home. That brought the final number of sites to 22. Trees from the planting inventory were allocated to sites at random (using two dice – one for species and one for size!).

Stock

The order to Baldwin Nurseries was for four replicates of each of three sizes (measured by pot size – 2-gal, 5-gal, and 10-gal) of each of the two species (red maple and red oak), for a total of 24 trees. They arrived in my driveway on the morning of 23 June. All were grown from NS seed and arrived in good condition. It was clear given the variation in actual pot size and the size of the trees in them that pot size is not a clear indicator of tree size. Thus, based on measurements of diameter at root collar (about 15 cm above ground or the root flare), we will reclassify the trees into sizes based on these measurements (see below).

The balled-and-burlapped (B&B) stock came from Beech Nursery West in Schomberg, Ontario, and is of unknown provenance. All trees appeared in good condition off the truck on 18 July, except that the leaves of the red maples appeared slightly dehydrated.

Planting

The Potted Trees: The 16 potted trees were planted on the morning of 25 June. Each root ball was scored vertically four times to a depth of about 3 cm with a knife, then planted with the root flare at ground level. Each tree was mulched to about 60-80 cm diameter about 8-10 cm thick. Each tree was given 20 L water that evening. Trees were staked and tethered on the morning of 27 June. One T-bar of 180 cm length was installed about 25 cm from the stem for tethering; two wooden stakes of 1.1 m length, 4 cm x 4 cm, were also installed some 25 cm from the stem as protective guards (against urinating dogs, lawn-tending equipment, and any other potentially intrusive agents; see the accompanying photo set).

The B&B Trees: the six trees – three red oaks (*Quercus rubra*) and three red maples (*Acer rubrum* Franksred) – were installed by Elmsdale Landscaping on 18 July. The standard procedures established by HRM for installation of street trees were used for planting and tethering. Specifically, these trees were also mulched and tethered with two T-bars placed parallel to the street. A protective sleeve made from 13-cm diameter perforated drainage pipe,

about 20 cm long, was placed on each stem, resting on the ground, as protection from lawn-tending equipment. The planting contract calls for a watering regime, as needed, over the two years of tree warranty.

Watering

At the time of writing this note (25 July), I had watered the 16 trees of potted stock on 25 June, 29 June, 03 July, 10 July, 14 July, 18 July, and 22 July. Each watering involves 18-20 L of tap water per tree, gently poured within 15 cm of the base of the tree. Halifax got about 30+ mm rain on 06 July but nothing else of note (i.e., sufficient to avoid having to water the trees) since the potted trees were planted. T-max each day since planting has been near or well over 20_C. I decided not to water the B&B stock because the contractor (Elmsdale Landscaping) is obliged to water the trees as needed until the end of the 2-yr warranty period.

Measurements

As of today, I have made a suite of measurements on each tree. A table is included below. In the table you will find:

_ civic addresses on Lawrence St. in front of which the trees are planted
_ the size of pot and species of tree (for potted stock)
_ the tree's dimensions – diameter at root collar (DRC), diameter at breast height (DBH), height (H)
_ what is above the tree in terms of other trees and power lines
_ when the tree was planted and by whom (the Dal team includes me and my summer research assistants)

Logistics and Costs

Since the experiment is looking at various aspects of planting trees of different sizes in the streetscape, I'm interested in how the costs might differ. Forthcoming will be a thorough reckoning of the costs to put in the potted trees (including tree and material costs). I will not include the labour of HRM staff in working with me to plan and execute the project because the staff also must deliver these services for contract-planted trees. And I will not monetize the value of our volunteer labour. What I can say about that is that it took six of us three hours to plant the 16 potted-stock trees, and I put in probably eight hours preparing and installing the stakes. HRM staff delivered mulch and removed excess soil, so that needs to be accounted for. Then there were materials costs including stakes and tethering wire. Finally, I put in about 1.5 hr each time I water the trees. The cost of the water (about 300 L each watering) is miniscule, and the water-delivery equipment was already in my possession. Apart from delivery of the trees and moving mulch and excess soil, no machines were run to plant and maintain the potted stock.

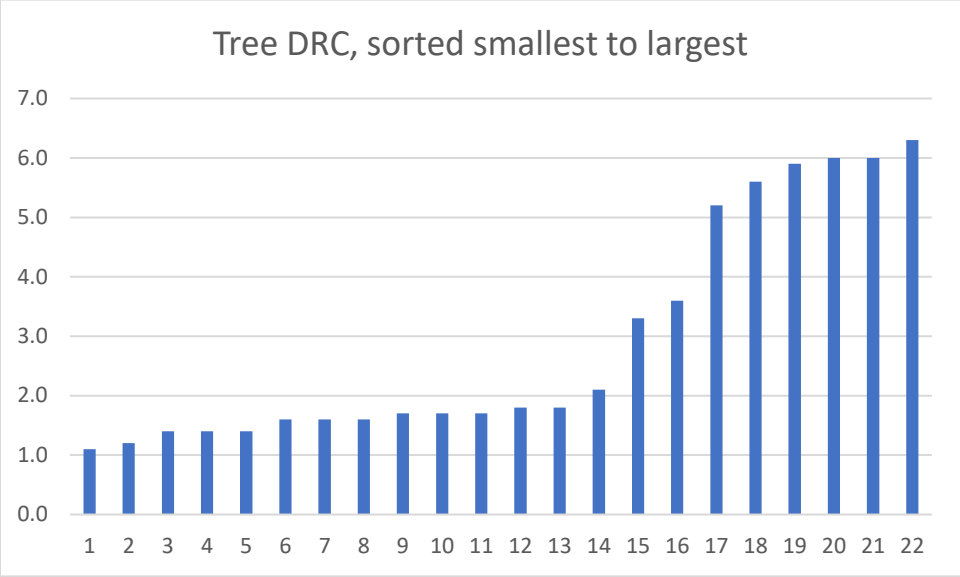
For the B&B trees, the planting occurred over about two hours total. The equipment list included two full-size dump trucks (one for excess soil and one for high-quality filling soil), a small digger, a small front-end loader, their respective floats, and service and traffic-control vehicles. Tethering and mulching involved another truck plus staff the next day, and the first watering also

involved a truck and one staffer. All costs associated with planting the B&B stock is bundled into a contract price of about $750/tree. Thus, the six trees cost $4,500 to install (and maintain for two years under warranty).

Lawrence St. Research-Trial Plantings (Duinker, 2022-07-23)									
Odd Side	Even Side	Size&Sp	DRC	DBH	H	Overhead		Date Planted	Planter
			(cm)	(cm)	(m)	Tree	Power		
6111		10G-RO	3.6	2.6	3.1		service	22_06_25	Dal Team
	6112	5G-RO	1.4	0.8	2.6	elm	all	22_06_25	Dal Team
6117		5G-RM	1.8	1.2	1.8	elm	service	22_06_25	Dal Team
	6124	2G-RM	1.1		1.6		all	22_06_25	Dal Team
	6132	5G-RM	1.7		1.8		all	22_06_25	Dal Team
6137		2G-RO	1.4	0.9	2.0			22_06_25	Dal Team
6155		B&B-RM	5.9	4.9	4.7		service	22_07_18	Elmsdale
6169		5G-RO	2.1	1.2	2.4	elm		22_06_25	Dal Team
	6174	2G-RO	1.6	0.9	2.0		all	22_06_25	Dal Team
6179		10G-RO	3.3	2.4	3.4	elm		22_06_25	Dal Team
6185		B&B-RO	6.0	4.8	4.1			22_07_18	Elmsdale
6185		5G-RM	1.6	0.8	1.7	elm		22_06_25	Dal Team
	6190	2G-RM	1.2		1.6	elm	all	22_06_25	Dal Team
	6204	B&B-RM	5.2	3.9	3.7	elm	all	22_07_18	Elmsdale
6205		2G-RO	1.6		1.8	elm		22_06_25	Dal Team
	6214	B&B-RO	5.6	4.6	3.7		all	22_07_18	Elmsdale
6217		5G-RO	1.7	1.3	2.8	elm+NorM	service	22_06_25	Dal Team
	6234	B&B-RM	6.0	4.9	4.1		all	22_07_18	Elmsdale
	6250	5G-RO	1.8	1.2	2.3	elm	all	22_06_25	Dal Team
	6300	B&B-	6.3	5.1	3.9	elm	all	22_07_18	Elmsdale
6319		2G-RO	1.4	0.9	1.8			22_06_25	Dal Team
	6328	2G-RM	1.7	0.7	1.8		all	22_06_25	Dal Team
All about 1.0 m to curb									
All in good condition									
xG = x-gallon pot									
B&B = balled and burlapped									
RO = red oak; RM = red maple									
DRC = diameter at root collar									
DBH = diameter at breast height									
H = height									

A Word about Tree Sizes

I had originally planned to group the potted stock according to pot size but the approach now will be to group the trees, species by species, according to diameter of the stem. Since some of the trees are too short to have a meaningful DBH, I used DRC for the size groups. Below is a histogram of all 22 trees ordered by DRC (cm on the Y-axis):



This is not the distribution I had hoped for, but it will suffice for this little experiment. I see three groupings in this dataset:

_ DRC > 4.0 cm – six trees, all the B&B stock

_ DRC range 2.1-4.0 cm – three trees (all red oaks, as it turns out)

_ DRC range 1.0-2.0 cm – the remaining 13 trees

Whether tree numbered 14 is more like its smaller or bigger neighbours is debatable – perhaps it should be 14 small and two medium. That will be sorted later.

Learning about the New Trees

My intention is to continue to post short articles now and then in this series of notes. As well, some time soon, I will advertise an opportunity for neighbours to walk the street with me to observe and chat about the trees on our street – both new ones and old ones.