

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

Note #03 by Peter Duinker, August 2022

The Importance of Watering New Trees

“Both container- and field-grown plants face the same challenge initially after planting: marginal or insufficient water absorption by the root system. Until they can grow a normal spreading root system, newly planted trees are dependent on frequent irrigation. Water stress is a common cause of planting failure” (page 150 in: Watson, G.W. and E.B. Himelick. 2013. *The Practical Science of Planting Trees*. International Society of Arboriculture, Champaign, IL).

So, newly planted trees in the streetscape require lots of water through their first seasons to get their roots off to a vigorous start. A new tree is busy getting its root-to-shoot ratio in balance, particularly the balled and burlapped trees (see photo) which each have lost up to 80-90% of their roots when excavated from the nursery field. (The root-to-shoot ratio is the abundance of roots compared to the abundance of twigs with leaves). The roots of the potted trees have been bound up in the organic growing medium at the nursery and must venture out into the potentially hostile soils of the streetscape. Water is the key to success.

Since planting the 16 new red oaks and red maples on Lawrence St. on 25 June, I have been tuned up to their water needs. When we planted the trees, the soils were very dry. Actually, they were still dry when the six balled-and-burlapped (B&B) trees were planted on 18 July. The following table shows the total sum of water the potted trees have received from rainfall and from my watering regimen. The B&B trees experienced that same rainfall after 18 July.

Date	Rainfall			PND
	Depth (cm)	Area (cm ²)	Vol (L)	Vol (L)
25_Jun				18
29_Jun				18
03_July				18
06_July	3.2	5000	16.0	
10_July				18
14_July				18
18_July				18
19_July	2.2	5000	11.0	
22_July				18
26_July	0.6	5000	3.0	
26_July				18
30_July	0.8	5000	4.0	
01_Aug				18
05_Aug				18
14_Aug	4.4	5000	22.0	
22_Aug				18
23_Aug	2.2	5000	11.0	
Total	13.4		67.0	198

The B&B trees were watered by the planting contractor on 20 and 26 July (and perhaps after that, but I have no

information as yet). There is no record of how much water each B&B tree gets at each watering, but I know it is substantial (perhaps 20-40 L per visit). I use 20-L plastic jugs to get water to the potted stock, and I assume that a few litres run off the site at each watering, so that explains my 18-L estimate per watering.

Some notes of explanation. The rainfall numbers above are from the Shearwater station, except for 23 August when I installed a rain gauge at my home. I have not included rainfall events below 5 mm (or 0.5 cm), assuming they are too small for water to penetrate the ground to the tree roots. I believe this is a fair assumption given how hot it has been this summer – with evaporation from warm ground and the appetite of the grass for water, small rainfalls really do not benefit the trees except perhaps for their cooling effect which would potentially reduce a tree's need to transpire water to cool the leaves.

To calculate volume of water available to each tree from rainfall, I had to make an assumption about the appropriate area of ground to use. For lack of a better approach, I figured that half a square metre would be more than enough. Some of the holes we dug for the potted stock were much smaller than this, and the hole dug for the B&B stock would be about this size, i.e., a circle of diameter of 80 cm. If I were to assume a small relevant ground area, the relative contribution of my watering regimen would be even larger than I calculated (see next paragraph).

I examined the rainfall normals for July and August for the Shearwater, Halifax airport, and Westphal stations. The “normal” precipitation (i.e., the average over 30 years) for those two months combined is about 19 cm (I'm using cm instead of the customary mm for an easy calculation of volume). If we don't get significant rainfall for the rest of August, that means we are in a drought situation this summer. A lower-than-normal rainfall plus the abundance of hot days in July and August means that new trees could easily become water-stressed if they do not receive supplemental watering. As evident from the table, my watering regime nearly quadruples the water available to the new trees from rainfall. A key question I'm now asking is this: have I overwatered the trees? Given the rate at which the water I give each tree disappears downward during the watering process, I don't think so. The organic medium in which the potted trees were grown has a huge water-holding capacity but also can dry out quickly.

Until the leaves drop in autumn, I will continue to monitor the rainfall and water the trees as I deem appropriate. A rainfall event of some 30-40 mm is roughly equivalent to each of my waterings. The trees' need for water goes down through the autumn and the rainfall amounts go up. I will do the same next summer, and by the third growing season in the streetscape, the trees should be able to fend successfully on their own. If in 2024 we get a really hot and dry summer, I will probably water them now and then. One thing is for sure – if any of the potted-stock trees dies in the next couple of years, it will definitely not be for a lack of water!

