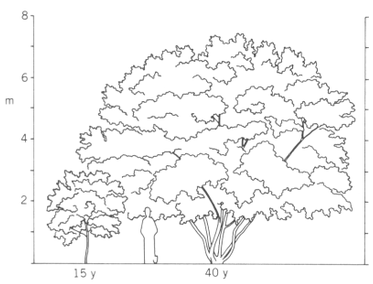
THE STUMP

SEPTEMBER 2014

KNOT THE HOLE NEWS



tatarian maple
Acer tataricum

Native to eastern Europe and western Asia, tatarian maple has potential as an unique tree in our landscape. It ranges from 15 to 30 feet tall and wide. Most often this plant is a large multi-stem shrub, but can be trimmed into a small rounded to wide spreading tree. This tree transplants easily and tolerant of difficult conditions including drought once established. Southwest Missouri is considered in the southern portion of this plants effective range. Leaves are simple, opposite, 2 to 4 inches long, usually unlobed, but vigorous growth may develop 3 to 5 lobes and look similar to amur maple (some consider amur maple a subspecies of tatarian maple), the petiole is 3/4 to 2 inches long. Flowers are borne in clusters in April to May, greenish-white and not very showy. These develop into samara 3/4 to 1 inch long in July—August, wings almost parallel in various shades of red turning to brown before falling off. The cultivar 'Rubrum' is reported to have blood red fall color. Specie fall color is yellow to red to reddish brown. Considered an invasive in some parts of the US.

Plant illustration by Jenny M. Lyverse, from Landscape Plants for Eastern North America, 2nd Edition, Harrison L. Flint Author

Tree Roots Improve Soil Infiltration Rates **by Nathalie Shanstrom from Deeproot.com**

As discussed in previous blogs, tree and soil provide stormwater benefits in many different ways:

- Cleansing: Trees clean stormwater through many different mechanisms, including filtration, adsorption, and plant uptake.
- Interception: Interception is the amount of rainfall temporarily held on tree leaves and stem surfaces. This rain then drips from leaf surfaces and flows down the stem surface to the ground, or evaporates.
- Infiltration: Infiltration is the movement of surface water into the soil, where it can be temporarily stored, infiltrated into underlying soil, discharged to an underdrain, evaporated back into the atmosphere, or taken up by plants.
- Transpiration: Transpiration is a process in which plants absorb water through their roots and transfer it up to the leaves, where it evaporates into the environment through leaf pore transpiration. Transpiration continues to reduce stormwater volume stored in the soil long after a rainfall event ends.

Many of these mechanisms rely on adequate infiltration rates in order to function properly, so today I want to discuss the effects of trees on soil infiltration rates in more detail. Since clogged soil negatively affects the other mechanisms through which trees provide stormwater benefits, maintaining adequate infiltration in Stormwater Control Measures (SCMs) is crucial. Without adequate infiltration rates, for example, less water enters the soil, so less can be cleansed by the soil, soil microbes, and roots, and less water is available in the soil for transpiration.

Many studies have found that trees significantly increase soil infiltration rates. For example:

- Several studies of infiltration rates before and after deforestation or forest fires found decreased infiltration rates after the trees were gone (e.g. Wondzell and King 2003 in Herrera 2008).
- Gonzalez-Sosa et al (2010) found higher saturated hydraulic conductivity in areas of broadleaved forests and small woods than in permanent pasture soil and cultivated lands.
- Skorobogatov et al (2013) compared saturated hydraulic conductivity in woody vegetation plantings such as shelterbelts, tree groupings in urban parks, and tree rows in golf courses, with similar soil and topography, to the surrounding areas without trees, and found that trees had a significantly greater impact on soil permeability compared to lawn without trees.
- Chandler and Chappell (2008) found that median and mean saturated hydraulic conductivity 3 m from the trunks of individual oak trees were a factor of 2.3 and 3.4, respectively, larger than those of the surrounding grassland without trees. Their literature review also cites 12 other studies in which the ratio of saturated hydraulic conductivity of the A soil horizon under trees to that under adjacent pasture ranges from 2 to 140.

How trees increase infiltration rates

So how do trees influence soil infiltration rates?

Living and decaying roots create a network of well-connected channels in the soil called macropores. Flow through these macropores can be up to several hundred times faster than flow through the soil matrix (Aubertin 1971 and Buttle and House 1997 in Chandler and Chappell 2008). In addition, organic matter from leaf litter and tree roots improves soil structure, which can increase infiltration rates. Soil structure is improved as soil particles are cemented together by humus, by organic glues created by fungi and bacteria decomposing organic matter, and by polymers and sugars excreted from roots.

Areas with trees generally have greater infiltration rates than lawn or pasture without trees because trees create more stable macropores. They do this for several reasons. The roots of dicotyledonous plants, like most trees, grow in thickness (secondary growth) as well as in length (primary growth). The roots of monocotyledonous plants, which include grasses, usually do not exhibit secondary growth, so their macropores are more prone to collapsing than the thicker macropores created by dicots. Also, woody plant roots have lining on their roots that further increase stability of the macropores after the root decays.

Impact of trees on infiltration rates in bioretention

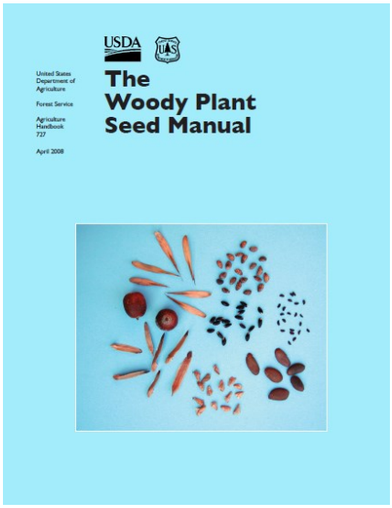
Not surprisingly, several studies have documented that vegetation maintains adequate saturated hydraulic conductivity over time in bioretention areas (e.g. Lucas and Greenway 2011, Hatt et al 2009). Breen and Denman specifically compared unsaturated infiltration rates of model soil profiles in above ground containers with trees to containers without trees and found that those with trees had higher infiltration rates. This tells us that even at a very young age, the trees were already having a positive effect on the hydraulic conductivity. Bartens et al (2009) also found that tree roots affected soil hydraulic conductivity even at a young age, and concluded that "woody roots can increase infiltration relatively quickly before there is opportunity for very large diameter roots to form and when root turnover is likely minimal…" and that therefore "it seems probable that water travelled around root channels along existing live roots."

Conclusion

Trees and soils, also known as green infrastructure, can be extremely effective stormwater control measures. Since clogged soil negatively affects the other mechanisms through which trees provide stormwater benefits, maintaining adequate infiltration is crucial. Trees can help. Many studies demonstrate that trees and their roots have a positive impact on soil structure, creating stable micropores to maintain adequate infiltration rates that keep these systems functioning well.

Book Review - The Woody Plant Seed Manual

Ever wonder when to harvest seed of a certain specie or how to care for it until you try to germinate it. This can be a hobby or part of a business. It requires knowledge and care to do it successfully. The Wood Plant Seed Manual provides good instructions to do this for most native species in the United States. The current edition was published in 2008. It had both paper and online PDF versions created. Paper copies are still available. The online version is located at: http://www.nsl.fs.fed.us/nsl_wpsm.html.



Pest Highlight - Phomopsis Tip Blight of Juniper

Caused by the fungus *Phomopsis juniperovora*, Phomopsis can occur on native and ornamental junipers. It damages new growth and succulent branch tips of junipers. Older tissue is resistant to infection. Affected foliage first turns dull red or brown and finally ash-gray. Small gray lesions often girdle branch tips and causes blighting of foliage beyond the diseased tissue. Small, black, spore-containing fungal fruit bodies develop in the lesions. Spores of the Phomopsis fungus are produced throughout the summer, and infection can occur whenever young foliage is available and moisture or humidity is high. Most infections usually occur in April through early June and again in late August through September. To reduce severity, maintain good air circulation, avoid wounding plants, water in early morning avoiding night watering, and destroy infected parts during dry periods. Fungicides are usually not needed for established plants.

> Rest is not idleness, and to lie sometimes on the grass under trees on a summer's day, listening to the murmur of the water, or watching the clouds float across the sky, is by no means a waste of time.
>
> *~J. Lubbock*

WHAT'S HAPPENING

September 16

Norman Washington Arboretum Tour, West Plains, MO, Register and get information from Jon Skinner (417-629-3423, jon.skinner@mdc.mo.gov)

September 22

"What's New in Horticulture": Professional Evening at Powell Gardens, Kingsville, MO, Information and Registration at: https://www.powellgardens.org/professionalevening

September 23

ISA Certified Arborist, Utility Specialist, and Municipal Specialist Exam, Tulsa, OK, Registration deadline September 5, 2014, Register at www.isa-arbor.com/certification/becomeCertified/

September 25

Joplin MCFC meeting, 7 AM - 9 AM, Wildcat Glades Conservation & Audubon Center, Joplin, MO

October 9

State MCFC meeting, 10 AM - 2 PM, MDC State Office, Jefferson City, MO

October 15

ISA Certified Arborist, Utility Specialist, and Municipal Specialist Exam, Jefferson City, MO, Registration deadline September 29, 2014, Register at www.isa-arbor.com/certification/becomeCertified/

October 16

Western Fall Field Day at Greenleaf Nursery, Park Hill OK.. For details call 888-233-1876

October 23

Joplin MCFC meeting, 7 AM - 9 AM, Wildcat Glades Conservation & Audubon Center, Joplin, MO

November 8

Joplin MCFC Hands-On Tree Pruning Workshop, 9 AM - Noon, Garvin Park, Joplin, MO For information contact Jon Skinner (417-629-3423, jon.skinner@mdc.mo.gov)

November 20

ISA Certified Arborist, Utility Specialist, and Municipal Specialist Exam, Fayetteville, AR, Registration deadline November 4, 2014, Register at www.isa-arbor.com/certification/becomeCertified/

December 9

ISA Certified Arborist, Utility Specialist, and Municipal Specialist Exam, Springfield, MO, Registration deadline November 19, 2014, Register at www.isa-arbor.com/certification/becomeCertified/

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