

The Mighty Oak and its Potential Loss
Dr. C Elizabeth Hamilton
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We've probably all heard of oak "masting" when the tree produce a massive number of acorns that are then shed and substantively change the ecology of the ecosystem within which they exist. The glorious wood thrush (please find a recording of its song because I think you'll agree it is glorious) offspring's' survival is dependent on these massive years of acorn production. Hold on – this is not because the acorns are a food resource but because they provide smaller rodents a food resource which then attracts raptors to the rodents as a food resource, which then protects the thrush offspring from rodent attacks¹. Which is a way of illustrating the complex web of life in a forest ecosystem. Another major recipient of acorn harvests are white-tailed deer, wild turkey, bobwhite quail, wood ducks, a menagerie of other birds and mammals. A couple of tiny illustration from too rapidly receding temperate forests and a miniscule example of the role oak trees play in hardwood forests. Can you imagine what these forests would look like without oaks? Do you want to?

What about the urban forest? These are important trees as well for urban forest ecosystems for the services they provide. These services actually save us money but are rarely recognized by local economies (at any scale) for the value they provide; we don't put money on cleaner air we just accept what we get. A healthy old oak tree can increase a home's value up to 20%; that's probably a nice number to think about. If located properly an oak can reduce household expenditures on air-conditioning. The roots in combination with their microbial partners (depending on how the surrounding soil/turf is treated) can filter pollution and reduce the city's costs for water purification and reduce contaminant levels in places we like to fish, while the canopy acts as an air filter reducing air pollution loads and consequently, individual health costs (for those with COPD or asthma or any other lung/heart issues). Priceless; then add to that their ability to sequester carbon in their woody tissues². The carbon stored by urban forests in the temperate climes found along the mid- to south-Atlantic can store about 17 million tons of carbon in their wood³. They can account for up to 10% of a cities forest canopy, while storing up to 50% of the carbon stored by the urban forest as a whole. A single oak can transpire up to 40,000 gallons of water annually⁴. Transpiration of water from leaves (think of it like sweating) lowers air temperatures (contributing to the microclimate change) as well as impacting rainfall events locally and globally.

Think about the diversity of oaks you come across in your neighborhood? Do you have pin, red, scarlet, chestnut, black, willow, white, all of the above? There are more than 30 oak species indigenous to the Eastern US. What if we lost just 10% of these in our forests and over 60% in our urban canopy? How do you replace a tree that's 50 or 100 years old? You don't.

¹ Schmidt, Rush, Ostfeld 2008. J. Animal Ecol 77:830-837.

² Edmondson et al. 2016. Scientific Reports :33708.

³ Nowak et al. 2012. USDA, USFS, Southern Research Station Report.

⁴ Monear and Brubisich; Dalla Urban Heat Island Study 2017.

But we are losing our oaks rapidly to a suite of diseases and the one I am focusing on here is generally referred to as Oak Decline or Rapid Oak Wilt Decline (ROWD).

Why are we losing them? A suite of diseases are attacking oaks that are already suffering from the challenges of living in an urban context which is further exacerbated by climate change. What does this mean? Well, we (arborist and research community) don't have a pinpoint cause for the decline but researchers do know that increased nighttime temperatures (air and soil) due to climate change are taxing the metabolism of trees. Like us, plants rest and when they can't rest adequately their immune systems are challenged. Add to that years of pesticide and fertilizer application to turf and the microbial community that is essential for plant immune function, and we have an urban forest of stressed-out trees. Thus, some of the fungi that once lived in them as a commensalist awaiting the natural death of the tree before becoming active, are activating early possibly because the trees are slowly dying early and/or the loss of their microbial partners isn't sufficient to help them engage in a robust defense. The trees are not able to fight other pathogens which are likely increasing in abundance because fungi and bacteria do enjoy a long warm wet winter followed by the same in spring and summer. These pathogens directly or indirectly, clog up the water and nutrient conducting tissues of the tree (vascular tissues) thus the appearance of drought and resulting dieback of stems. The bacteria can directly impede vascular flow (I think of it as having high bad-cholesterol) and the tree in its attempt to block further infection, creates its own vascular blocks. Double whammy.

What you can expect to see from an oak in decline are: late bud-break, tip dieback in the canopy and sometimes 'weeping' from the trunk (more symptoms and details can be found on my blog at www.betternature.solutions). There are a couple of other diseases with similar but not identical symptoms and I provide pics on the blog. They do however, all share the drought-like response even when the tree is exposed to plenty of rainfall.

Managing the disease is managing the health of the tree to increase its ability to fight its own battle and it is best to start from ground-up. I call this a ground-to-crown solution. Healthy soil = healthy diet = strong immune system. We creatures need the same basics. By supplemental watering trees when there are seven or more days of no rain during temps > 80F, not mulching at the base of the tree, treating with friendly microbes rather than a weed and feed type of product, as well as calling in your friendly neighborhood plant health care specialist, these trees can be saved. Not every arborist knows enough about tree ecology and the connections between tree, soil, and microbes to do great work. Quiz them! Ask them if they recommend a high N or P based fertilizer (the answer should be no). Do they recommend you take out the dead wood during the spring or summer (the answer should be no – only prune these trees when dormant). Where is the best place to mulch a tree? They should tell you at the drip line and beyond because this is where the roots primarily involved in water uptake (from rainfall or your hose) are most active.

Treating a complex disease takes a complex mode of action. Systemic fungicides, combined with soil/tree root health and supplemental watering will help us keep these majestic beauties longer and provide pollen critical to their survival in the forests surrounding us. We receive a

tremendous amount of ecosystem services from our urban canopy and the older it is the more we get in return with direct and indirect financial consequences. It's a small price to pay to save our oaks and an enormous loss if we don't do so.