

- 1) I totally understand the problem of trees falling on lines, but why does the utility need to whack 12-15' from trees growing UNDER powerlines in an urban area that is not prone to outages or powerline caused fires? And by "whack", I mean whack. The utility professes top-directional pruning, but stubbing trees below powerlines is not top-directional "pruning".
In a perfect world, we wouldn't plant pines, maples and bamboo underneath powerlines. "Right tree in the right place" is a constant refrain from vegetation managers, meaning if an inappropriate species is planted below the line, the utility has no choice but to prune it sufficiently to provide adequate clearance from energized conductors. As we all know, trees grow at different rates, and for reliable electric reliability, sometimes they do not look attractive after the fact.
- 2) How to address a risk tree not located in right of way or easement and is a likely fail on utility?
It depends. Contact your local utility if it is within ten feet so as to comply with MAD (minimum approach distance) and OSHA 1910.269. They will let you know what their policy is.
- 3) Has research found a correlation between routine cycle pruning and tree failures? or routine cycle pruning and tree resilience?
The focus of *this research* was not directly related to those two issues. However, outages due to trees growing and blowing into the lines are greatly reduced by routine cycle pruning. Tree resilience is affected by a myriad of factors including water availability, forest pests, root compaction, species compatibility, etc. Google Scholar may have the answer to your question!
- 4) Is there research on the other end of this? I.e., improving the hardware that is installed (eg. aerial cable, insulation, more source side devices to reduce the extent of an outage). Also the placement of powerlines, especially new installations, should be such that allows for as many trees as possible. Many areas require underground installations for all new construction.
Much new construction is underground, especially in subdivisions and urban/suburban areas. However, it's expensive, which gets passed on to rate payers. Another thing to remember is that 1/3 of the tree grows underground so any trenching and tunneling can greatly affect tree health, particularly in narrow tree spaces.
- 5) Were you able to determine the trunk failures on species type? Fast vs slow growers?
Short answer, yes. Trunk failures were most prevalent across species. However, softwoods had the highest percentages of trunk failure. Other species with forest health conditions such as ash trees and EAB were 77% likely to fail by trunk.
- 6) Would 'decay' or fungal conks be considered defects? did you look at the trees for fungal pathogens afterwards?
We considered decay a defect, as well as fire scars, cavities, peeling bark, significant insect and woodpecker damage, cankers. We also looked for cracks, lean and co-dominant stems.

- 7) Of the trees with no defects found. Was summer limb drop or sudden limb drop a part of this data or a different set of data?
Great question! In our study, outages caused by limbs peaked in January, July and September. We will be examining the correlation between common limb drop in species such as oak, sycamore and specific times of year more closely in the coming months.
- 8) Data is always intriguing and informational, but absent of analysis of pruning technique. It seems species data can be misleading, i.e., lion-tailing has a more drastic effect on ash than oak due to structural weaknesses typical for the species. Data from unpruned trees might say more about species tendencies. Can you comment?
The focus of this *practical* research was directly related to power outages caused by trees. For the most part, ash trees succumbed to the EAB over the last several years, so we cannot comment on that species. In addition, most utilities focus on ANSA300 standard pruning techniques, so as to not cause harm to trees adjacent to our facilities. If you think about it, it makes sense to make proper pruning cuts to maintain tree health, if your goal is fewer tree caused outages. The great thing about research is that if someone has not focused on pruned trees vs. unpruned trees in their research, you can suggest that to the committees that commit funding to projects, such as the UARF, ISA, etc.
- 9) Is your research also looking at root zone issues such as insufficient root space, recent construction, compaction, etc.)
Good point. However, our study parameters were overhead lines and tree caused outages in a semi-rural area of Virginia. This sounds like a great opportunity for further research!
- 10) In your review of root instigated failures, did you observe damage to the root plate or limited structural root growth as a result of the environment the tree was growing in, e.g. paving, hardscape, etc.
We did not. Most of the study area was in wood lots, although some was also roadside. We did look at the type of root failures – root plate, root decay and roots broken or severed. However, as there were very few root failures observed, except in May, we focused our efforts on other factors.