

The Science of Tree Selection

by Andrew D. Hirons, PhD

Trees have no foresight; they have a multiplicity of other assets, but are not able to predict the future. If a tree does suggest your future wife, offer advice on your next career move or give you a racing tip, it is time to find a professional psychiatrist – or at least put down the moonshine.

However, for tree selectors, this simple observation has one clear implication: it is your role to provide foresight and to anticipate future threats. Too often though, tree selection decisions are born out of our desire for an aesthetic landscape and not on the necessity of a sustainable, resilient landscape.

As a community of tree professionals we must be more focused than ever before on delivering an urban forest that performs; this means planting trees that are capable of thriving, not simply surviving.

From a biological point of view, one way to achieve this is to learn more about a species through the study of particular traits that reveal something about the tree's ecological preference, growth characteristics or environmental tolerance. As water deficits are a major source of stress for trees in urban environments, a particular focus of my research has been to look at traits that infer a degree of drought tolerance. Indeed, much of this research has been kindly supported by the Hyland R. Johns Grant, provided by TREE Fund. A particular focus has been on a trait known as the leaf turgor loss point. This is a characteristic that indicates the water potential at which the tree will not be able to recover from wilting and will no longer be able to extract water from the soil.

Together with my main research collaborator, Henrik Sjöman, we have been able to screen almost 200 tree species to help quantify how drought tolerant each species is. Combined with a range of other evidence from the scientific literature, this has helped provide more robust evidence for species recommendations, particularly for paved environments. Although we have published several academic papers on our work, perhaps the most accessible output is the freely available [Tree Selection for Green Infrastructure](#) published by the [Trees and Design Action Group](#). This digital guidance translates much of our science into a format that is suitable for a wide range of professionals engaged with the vital task of selecting trees for our urban environment.

*Dr. Andrew Hirons is a Senior Lecturer in Arboriculture at University Centre Myerscough, UK. He began his career in arboriculture as a climbing arborist and plant health care technician, gaining experience in Australia, America and the UK before joining the arboriculture department in 2004. He teaches full-time and online higher education courses, delivering modules relating to tree biology and tree management. As well as teaching, he is actively involved with research that focuses on the use of plant traits to inform species selection for urban environments. He is also the co-author of *Applied Tree Biology*, a book that aims to help arborists understand how tree biology applies to tree care practices.*



Behind the Research: Meet Dr. Andrew Hiron

There are those who know, right from the start, *exactly* what they want to be when they grow up. Dr. Andrew Hiron was not one of those persons. When I ask him what piqued his interest in trees, higher education, and research, he chuckles. “As a teen, it was clear that life in an office was not for me. Ironically, I wound up in one.”

Andrew’s pursuit of arboriculture was a matter of whittling down land-based, outdoor career options. Whilst his father managed a farm and taught agricultural sciences, he was drawn to arboriculture for the fun – an opportunity to climb trees, use chainsaws, and travel the world. As part of his Arboriculture BSc (Hons) program at Myerscough College, he spent a year climbing at ArborCo in Melbourne, Australia, servicing high-end client properties. After graduation, he still had the travel bug and took a climbing arborist job with Arboguard in Atlanta, Georgia, again working on privately-owned high-end properties, including Augusta National Golf Course.



Returning to the U.K. a year later, Andrew found a job teaching arboriculture at his alma mater and gradually got more involved in biology and research. His general area of expertise is tree biology, but he has a particular interest in tree water relations. Since receiving his PhD from Lancaster University, his research has focused on understanding drought tolerance in trees; much of this work has been done in partnership with Dr. Henrik Sjöman (Swedish University of Agricultural Science and Gothenburg Botanic Garden). By chance, the two sat next to each other at a conference dinner, began talking, and found that they not only share an interest in this topic, but they both believe that research needs to be accessible and presented in a way that is useful to tree practitioners and other green industry professionals. Their fruitful collaboration combining Henrik’s specialty in tree dendrology and ecology and Andrew’s knowledge of tree physiology has produced not only useful research but a new species selection guide, [Tree Selection for Green Infrastructure](#), based on biological traits such as drought tolerance and water logging tolerance. Some of their TREE-Fund supported work underpins recommendations in the guide. For practical reasons, the guide is limited to tree species in the U.K., but as many of those species grow in North America and Europe, it is being downloaded (for free) and used by thousands across the globe.

Andrew hopes the guide helps move decision makers towards selecting appropriate trees based on functional criteria rather than pure aesthetics or previous experience with a species, and nurserymen towards growing species for functionality, thus increasing the chances that such trees will survive in the long run. He explains, “Experience is a huge factor in tree selection, but experience has no foresight. As decision makers in the urban environment, we need to have a huge amount of foresight. Our climate is changing. We need to equip the tree by selecting appropriate species for future scenarios; rely less on experience and more on foresight.” Andrew would like to get to the point where we understand the fundamental biology of trees such that we can match them to the specific sites and functions that we want them to deliver.

While the species selection guide has been well-received, Andrew does not consider it his most significant contribution to the wider arboricultural world. He reserves that distinction for *Applied Tree Biology*, the book he wrote with Peter Thomas (Keele University, UK) when he couldn’t find exactly the right text for teaching his students. Apparently others were facing the same dilemma, as the book has sold over 1,000 copies to date.

So has Dr. Hiron found exactly what he wants to be when he grows up? It’s hard to say. But for now, he is enjoying his balance of teaching and research, and he’s excited about the possibilities of trait-based tree selection for the future of the urban canopy.

Read about Dr. Hiron’s TREE Fund supported research [HERE](#).

Watch Dr. Hiron’s webinar, “[Drought Tolerance in Trees – Improving Tree Selection for Challenging Urban Sites](#)”