ARBORICULTURE REVOLUTION

Arborist Matthew Daniel talks to us about PhotosynQ: a Tree Health Calculator he says is the next big game changer for arboriculture globally.

How do we currently assess tree and soil health? Simple. Arborists make a Visual Tree Assessment and base their findings and any treatment or works plan on years of experience and knowledge. All well and good, but could there be a less subjective and more scientific approach, based on measurable parameters, that could provide more reliable results and outcomes?

Matthew Daniel, CEO of Global Urban Forest in Victoria, believes so, and is at the forefront of a new platform in measuring plant health – and specifically photosynthesis – that he says could revolutionise the arboriculture industry both in Australia and around the world.

How? It's all about making things "open source", where information – in this case photosynthesis including soil health and function data of trees – is gathered and shared as a public collaboration and made freely available.

Matthew's most valued possession he was given the first multispeq v1.0 that was built and tested and then signed by the PhotosynQ team after testing the prototype.

Loosely, this is what Facebook does too. You make a profile and collaborate with others. Unlike Facebook though, Matthew says this international science project called PhotosynQ, and Matthew's project development the "Tree Health Calculator", is offering something truly positive. It's where anyone – an arborist, researcher, farmer or just Joe Public – can collect and log tree and soil data using a simple hand-held device.

The information is then shared and can be interpreted with sophisticated analytics (and in future via artificial intelligence), meaning tree health assessment can be based more on scientific data rather than visual assessment and human perception.

Matthew says it's a game changer to benefit arboriculture, arborists, the urban forest industry and even the way science itself is conducted. Compelling stuff, but what's it all about and can it really bring about the revolution he predicts?

It's hard to fault Matthew's credentials to make such a claim. An articulate, intelligent and passionate individual, he has 23 years' experience in arboriculture and was personally selected by Michigan State University in the USA as the only arborist in the world to be involved with the PhotosynQ platform's development, alongside a team of scientists, engineers, biophysicists, researchers and tech experts.

His story begins in 1994 when he was granted what he believes to be the first and only arborist scholarship in Australia through Launceston City Council. Far from being thrown up a tree with chainsaw in hand on his first day, his scholarship revolved around academia and scientific

studies before training as a climbing arborist and horticulturalist.

Back in the 1990s Launceston was the first Council to conduct a GPS inventory of its trees – revolutionary for the time – and Matthew's involvement with this helped him secure an invite to the USA as climbing arborist for Boston Tree Preservation and the Arnold Arboretum of Harvard University. As part of the deal he furthered his studies there, becoming well versed in the science behind soil health and biological soil remediation.

Three years ago the call came from Michigan State University regarding the PhotosynQ project at David Kramer's lab. "Kramer realised if we could develop a simple hand-held tool, put it in the hands of people globally and put all the collected data in one place, we could learn so much about global plant health and photosynthesis," Matthew said.

The tool produced is a hand-held sensor device called a MultispeQ, which combines the functionality of a handheld fluorometer, a chlorophyll meter and a bench-top spectrometer which claims to bring "laboratory quality measurements to field applications." It can also measure ambient temperature, pressure, humidity, contactless leaf temperature, leaf angle and direction, plus it utilises geotagging and time stamp features.

Additionally, the platform allows for individuals to design their experiment around specific requirements. "This flexibility in experimental design and data collection makes PhotosynQ an incredibly powerful tool to help understand our environment," said Matthew. "This experimental design flexibility has allowed me to create the Tree Health Calculator and combine my years of research into plant and soil health into a single platform and conduct detailed analysis." All very clever and scientific, but why should all this gathered information matter?

Matthew says it's key to help manage the urban forest is a scientific way. Once this can be done successfully, it can be to the benefit of urban dwellers and those employed by the arboriculture industry to manage and maintain the trees more effectively. "It will also develop a path in attributing a functional value of trees and in turn increase the value of individual trees, across multiple factors," Matthew said.

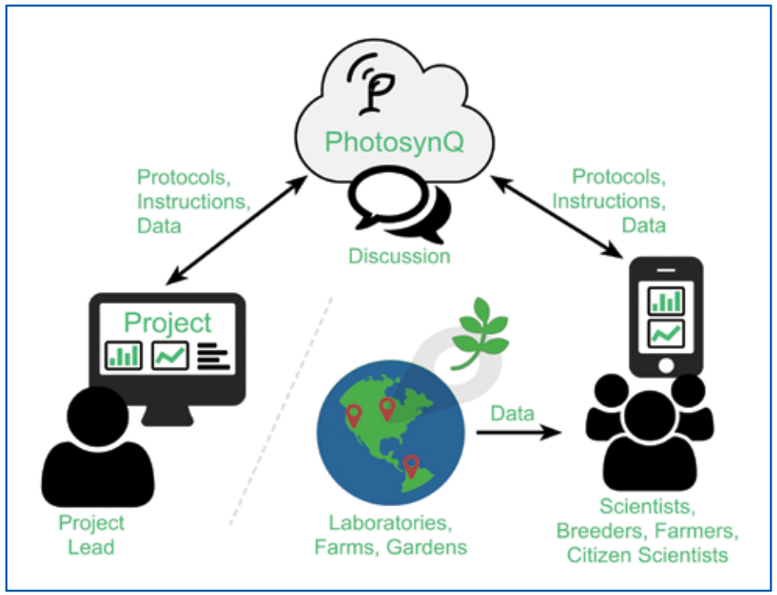
"This information will be utilised by future generations to effectively manage the environment within quantifiable and holistic rules and principles."

How so? Any arborist will tell you why trees and tree health are so important to urban areas, but the general public and particularly municipal authorities such as councils need a bit more educating. "If everyone can acknowledge that trees have a functional and long-term value, just like a road or a footpath, they become valuable assets," Matthew explained.

"If a particular tree or trees have a higher asset value to the community as a whole, then it becomes very valuable. It is worth protecting, maintaining and spending money on. This benefits anyone who could work on that tree. Companies and individuals in arboriculture get more work, get paid more and can get more funding from municipals. This will increase the arboriculture industry exponentially, and by default improve the health, function and long-term viability of the urban forest."

Matthew says the PhotosynQ platform is the right tool to make a "functional value" of trees based on scientific data. You see, raw figures are far easier (and persuading) to present to councils than the opinions of arborists. If the data conclusively shows how well healthy trees are performing photosynthesis and other essential services, and therefore helping reduce carbon dioxide levels in urban spaces (and the impacts of climate change) there'll be an onus on creating more urban forests and keeping those trees in tip top shape. And arborists busy.

For the project to gain traction, arborists in particular need a MultispeQ tool in their



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hands. This will provide the required data and offer real-time feedback of both tree canopy and soil health. The information is then uploaded to the open data platform PhotosynQ/Tree Health Calculator via your smartphone, and all the information will be publically available. “This information will be utilised by future generations to effectively manage the environment within quantifiable and holistic rules and principles,” Matthew said. “We can learn so much about tree health very quickly with this data.”

Certainly the potential is there for a huge amount of important data to be gathered, which can only be of assistance to arborists and urban forest managers. If you can look back and see exactly when a tree had been pruned, how were its health and photosynthetic efficiency, and any treatments provided to the tree or soil, you can gauge how successful the tree management has been, and what can be improved.

“The urban forest is already a multi-billion dollar industry,” Matthew said. “In the future it will be one of the biggest global industries and tree health in the urban forest will need to be a lot more science-based rather than subjective. This is key to getting funding. We need to validate our work, and provide a functional value of individual trees.”

So how can people get involved? The MultispeQ tool is for sale in the USA for US$600 at present with no licensing requirements or hidden costs, and Matthew says Swinburne University in Melbourne has got on board the project. “We’ll provide a curriculum and how to use the MultispeQ tool and PhotosynQ platform,” he said. “I’m not trying to license it and make millions out of this, instead we’re trying to develop it to advance the industry, and provide following generations with valuable data to better manage the natural assets that make up the urban forest.”

Can it be revolutionary? If nothing else, accurate data collection openly shared can surely only be a good thing to effectively manage tree health; knowledge is power after all.

The potential for PhotosynQ does appear vast, and with the enthusiasm and expertise Matthew is throwing behind it, perhaps it really can be the game changer he and others envisage.


The first Multispeq 001 v1 developed by PhotosynQ being used to measure tree health around Australia.


The prototype MultispeQ used by the team of global beta testers that was 3D printed.

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For more information visit www.globalurbanforest.com.au, www.photosynq.org and https://photosynq.org/users/matthew-daniel AA