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A device rooting for tree life

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A file pic of a tree, that is almost on its last legs, in Austin Town

By Garima Prasher

Researchers acquire portable machine to gauge tree health, water content without damaging it

Institute of Wood Science and Technology (IWST) Bengaluru has acquired a device that can detect ailing and decaying trees without damaging them. It's a portable device which gauges the health of trees on the inside through 3D imaging.

Electric Resistance Tomography (ERT) is a non-destructive technique to evaluate standing trees and ascertain their health conditions. According to IWST researchers, until now, inspections of trees were conducted using an invasive technique that ended up damaging them.

"Until now, the Core Sampling method has been used to ascertain the health of a tree. Under this technique, a cylindrical tree core is drilled out for the analysis. This creates a hole in the tree every time a sample is collected. If not plugged with the right amount of wax at the right time, trees get infected if insects or pathogens enter the hole, damaging the heartwood," said Dr BN Divakara, senior scientist, IWST.

In ERT, a set of 8-24 nails connected with a wire are wrapped around the tree and an electric current is passed through the wire to capture the image. A 3D structure of the tree is developed through multiple cross-section images. From the image thus obtained, the total volume of the heartwood is calculated and converted into biomass value. This furnishes the amount of heartwood in kilograms.

According to IWST scientists, ERT can also estimate the water content of a tree and ascertain if it is healthy or decaying. Researchers said the estimation will help avert many accidents and deaths due to trees falling in Bengaluru.

"The number of sensors to be fixed on the tree for ERT measurements depends on the circumference of the tree. A minimum of eight sensors are needed even for smaller trees. The images generated from the instrument are based on electrical resistance and electrical conductance. The water content, ion concentration,

cell structure and other properties of the wood influence the electrical impulses passed through them and can indicate if the tree has decayed from inside and can come down crashing anytime. It is always better to remove such trees before accidents occur," explained Dr. Divakara.

Until now, the Core Sampling method has been used... This creates a hole in the tree... and trees could get infected

–Dr BN Divakara, senior scientist, IWST

The device has been imported from Germany and is currently being used to estimate the heartwood content of Red sandalwood.

"We are working on commercially important tropical timber tree species to analyse the value of these trees. We have standardised the instrument by using readings from multiple trees and have made it useful for heartwood estimation. Estimating the amount of heartwood can help the farmers understand the price of the timber," said Dr. MP Singh, director, IWST.
The machine is lightweight, portable and has inbuilt power storage. Moreover, it can create 3D images of around 50 standing trees in a day.

"We have measured the accuracy of the machine and it turned out to be 86 per cent. The technology uses distinction in the density between the heartwood and sapwood in a standing tree and can map the amount of heartwood. If we can sample more trees, data science can deliberate and predict the amount with better accuracy in the future," added Dr Singh.