Scientists discover, climb and describe the world's tallest tropical tree

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The view from the bottom of the tallest tropical tree in the world. Credit: Unding Jami

Scientists in the U.K. and Malaysia have discovered the world's tallest tropical tree, and possibly the tallest flowering plant, measuring over 100 metres high—laid down, it would extend beyond both goals on a football

pitch.

The team found the tree in the rainforests of Sabah, Malaysian Borneo, and have undertaken a novel three-dimensional exploration of the remarkable find to better understand how trees grow so tall, and what keeps them from growing taller.

The tree is a Shorea faguetiana (common name Yellow Meranti), of the Dipterocarpacae family that dominates the humid lowland rainforests of South East Asia. Previous record breakers have largely come from the same genus (Shorea) and region.

The team has given the tree the name Menara, which is Malay for 'tower'.

The tree was first spotted by researchers from the University of Nottingham led by Dr. Doreen Boyd in 2018, using an airborne Light Detection and Ranging Survey (LiDAR) where lasers pulses are reflected off the canopy and ground surface. Researchers from the University of Oxford and SEARRP partners then trekked out to Menara in August 2018 to conduct high-resolution 3-D scans and drone flights, which have produced remarkable 3-D visualisations of this amazing tree.

A local climber, Unding Jami, climbed the tree in January 2019 to measure its height with a tape measure; it came in at 100.8 meters, making it also a probably the tallest flowering plant on Earth (beating the previous record holder: a eucalyptus tree in Tasmania).

Dr. Boyd said: "By following up the discovery of the tree by my Ph.D. student, Chris Chandler in the airborne data, with a terrestrial laser scan and drone flight by colleagues at University of Oxford, we were able to establish additional dimensional information about the tree, and to examine the mechanics of such giant trees in general."

The only man who has climbed this giant, Unding Jami of the Southeast Asia Rainforest Research Partnership (SEARRP) in Sabah, Malaysia, recalls: "It was a scary climb, so windy, because the nearest trees are very distant. But honestly the view from the top was incredible. I don't know what to say other than it was very, very, very amazing!"

Excluding roots, Menara weighs 81,500 kg, or more than the maximum takeoff weight of a Boeing 737-800. Only 5% of its mass is held in its 40m-wide crown, whereas 95% is in its trunk. The stem is very straight, with the centre of mass at 28m above the ground and only displaced by 0.6m from the central vertical axis, suggesting the tree is highly symmetrical and well-balanced despite being situated on sloping ground in a sheltered valley.

So, is this tree near its limits in terms of how high a flowering plant can grow?

The scientists' analysis of the tree's structure suggests that that Menara is a long way from buckling under its own weight, but may be vulnerable to wind breakage. Its location in a sheltered valley protects it somewhat and probably aids it to grow to such extreme heights.

Dr. Alexander Shenkin, the researcher at the University of Oxford who conducted the 3-D scans, is interested in the architecture of trees and what limits their heights. "The jury is still out on what keeps trees from growing ever taller. Our' analysis of the tree's structure suggests that that Menara is a long way from buckling under its own weight, but may be vulnerable to wind breakage. Its location in a sheltered valley protects it somewhat and probably aids it to grow to such extreme heights. There may also be other factors, such as the challenge of sucking water 100 m up a tree,that limit the maximum height of broadleaf trees to around 100 m."

Are there likely to be still taller trees out there?

"There could still be taller trees out there yet to be found, however given the evidence we have found on the mechanical constraints caused by the wind, it is unlikely any new tree would be much taller. But it is likely that the tallest extant flowering plant still sits undiscovered somewhere in the forests of Borneo," adds Prof. Yadvinder Malhi of Oxford, who leads the lab studying the 3-D structure of the tree.

"The discovery of this remarkable tree provides additional recognition to, and impetus for, efforts to conserve these magnificent, biodiverse and record-breaking tall rainforests"

Menara was found in the Danum Valley Conservation Area in Sabah, which also held the previous record for the tallest tree. Dr. Glen Reynolds, of SEARRP, oversees much of the research there. "Over the past decade the Sabah Forestry Department has progressively extended the protection of several hundred thousand hectares of forest in the vicinity of the Danum Valley Conservation Area – which is now buffered on all sides by totally protected areas. The Sabah Government has also committed, by 2025, to increase the extent of protected forests to 30% of the State's land area. These investments will help secure the future of this landscape of giants."

A full copy of the paper detailing the find is available on request, and is in review in a scientific journal.

A drone's view of the tallest tropical tree in the world. Credit: Alexander Shenkin

Provided by University of Nottingham