

Scientists develop an app that measures a tree's leaves' exposure to sunlight

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The smartphone app Ahmes, developed by a group of Spanish scientists, measures the angle of a tree's leaves and calculates their position with respect to the sun. Its name pays homage to the Ahmes Papyrus, also known as Rhind Mathematical Papyrus, written during the reign of Apophis I.

Scientists have used this tool with two populations of wild olive trees (*Olea europaea*) from Madrid and the Balearic Islands. With the help of the app, they have measured the inclination angle and the orientation of their leaves, calculated at different times of the day between dawn and dusk.

"The research shows that some leaves are highly exposed to sunlight in some moments of the day, whereas others are far less exposed, which could reveal the tree's strategy for receiving or avoiding light," the researchers explain. Their research has been published in the *Annals of Botany*.

Some of the factors that intervene in the exposure to sunlight are latitude, time of day and year, inclination and orientation of the leaves, and shade. Wind is also important, since it can alter the position of the leaf as well as the duration and intensity of the shade.

Although the researchers studied olive tree populations located in different places, they have not found significant differences between them, perhaps because they were at the same latitude.

"The complementarity pattern we observed in different parts of the top of the trees from Madrid is very similar to that of the trees from Menorca," the researchers write. Thus, scientists have observed a daily pattern in leaf exposure in different parts of the tree tops.

The application developed for the research, which is also being used in class, is aimed at students and teachers alike. It is available for free in the Google Play store for Android devices. "We have used it in a biology course at the UCM and in a project from the department of Vegetable Biology I, at the same faculty", the researchers say.

The technology characterizes the spatial position of any element that could be treated as a plain surface or could be split up as an ensemble of plain surfaces. "With this application, every student or educator can transform their phones into a tool with the ability to verify hypotheses from different fields," the scientists conclude.

More information: Adrián G. Escribano-Rocafort et al. The expression of light-related leaf functional traits depends on the location of individual leaves within the crown of isolated trees, *Annals of Botany* (2016). [DOI: 10.1093/aob/mcw004](https://doi.org/10.1093/aob/mcw004)

Adrián G. Escribano-Rocafort et al. Simplifying data acquisition in plant canopies- Measurements of leaf angles with a cell phone, *Methods in Ecology and Evolution* (2014). [DOI: 10.1111/2041-210X.12141](https://doi.org/10.1111/2041-210X.12141)

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