

Plants use sugars to tell the time of day, study finds

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Plants use sugars to tell the time of day, according to research published in *Nature* today.

Plants, like animals, have a 24 hour 'body-clock' known as the circadian rhythm. This biological timer gives plants an innate ability to measure time, even when there is no light - they don't simply respond to sunrise, for example, they know it is coming and adjust their biology accordingly. This ability to keep time provides an important competitive advantage and is vital in biological processes such as flowering, fragrance emission and leaf movement.

BBSRC-funded scientists from the University of Cambridge Department of Plant Sciences are studying how plants are able to set and maintain this [internal clock](#). They have found that the sugars produced by plants are key to timekeeping.

Plants produce sugar via photosynthesis; it is their way of converting the sun's energy into a usable chemical form needed for growth and function.

This new research has shown that these sugars also play a role in [circadian rhythms](#). Researchers studied the effects of these sugars by monitoring seedlings in CO₂-free air, to inhibit photosynthesis, and by growing genetically altered plants and monitoring their biology. The production of sugars was found to regulate key genes responsible for the 24 hour rhythm.

Dr Alex Webb, lead researcher at the University of Cambridge, explains: "Our research shows that sugar levels within a plant play a vital role in synchronizing circadian rhythms with its surrounding environment. Inhibiting photosynthesis, for example, slowed the plants internal clock by between 2 and 3 hours."

The research shows that [photosynthesis](#) has a profound effect on setting and maintaining robust circadian rhythms in Arabidopsis plants, demonstrating a critical role for metabolism in regulation of the [circadian clock](#).

Dr Mike Haydon, who performed much of the research and is now at the University of York, added: "The accumulation of sugar within the plant provides a kind of feedback for the [circadian cycle](#) in [plants](#) – a bit like resetting a stopwatch. We think this might be a way of telling the plant that energy in the form of sugars is available to perform important metabolic tasks. This mirrors research that has previously shown that feeding times can influence the phase of peripheral clocks in animals."

More information: Photosynthetic entrainment of the Arabidopsis thaliana circadian clock, [DOI: 10.1038/nature12603](https://doi.org/10.1038/nature12603)

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