

Circadian clock controls plant growth hormone

August 13 2007



Growth in *Arabidopsis* seedlings is influenced by the plant's internal clock through the plant hormone auxin. Credit: Michael Covington/UC-Davis

The plant growth hormone auxin is controlled by circadian rhythms within the plant, UC Davis researchers have found. The discovery explains how plants can time their growth to take advantage of resources such as light and water, and suggests that many other processes may be influenced by circadian rhythms.

Auxin tells shoots to grow away from the ground and toward light and water. Charles Darwin conducted early experiments that showed how auxin affects plant growth. Most plants and animals have an internal clock that allows them to match their activities to the time of day or season of the year.

The circadian rhythms appear to act by "gating" the effect of auxin, the researchers said. In other words, the plant becomes more responsive to auxin at a certain time of day.

Postdoctoral researcher Michael Covington and Stacey Harmer, professor in the Section of Plant Biology at UC Davis, used microarray chips to look at thousands of genes from the laboratory plant *Arabidopsis* at the same time. About 10 percent showed some regulation by time of day.

In the auxin signaling pathway, nearly every step in the chain of events from the production of auxin through to the final growth response showed some regulation by the clock.

Covington and Harmer made plants that would glow when the auxin signaling was active. They found a natural rhythm of activity, peaking late in the night when water is most available and the plants are preparing for daylight.

A circadian response to auxin was actually observed in 1937 but then forgotten for 70 years, Harmer said. The researchers hope to understand exactly why having a functional internal clock is important for plant health.

Source: University of California - Davis

Citation: Circadian clock controls plant growth hormone (2007, August 13) retrieved 19 September 2024 from <https://phys.org/news/2007-08-circadian-clock-growth-hormone.html>

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