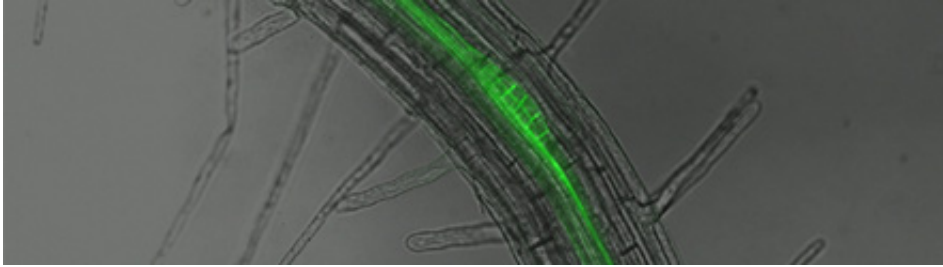


# Rooting about with circadian rhythms

July 9 2015, by Lindsay Brooke

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The circadian clock drives our physical, mental and behavioural changes. In fact most living things respond to the solar and lunar cycle – day and night. And plants are no different. But scientists at The University of Nottingham have discovered how plants manipulate their biological clock to encourage the growth of lateral roots.

Their research, published in the academic journal *Nature Communications*, has shown that the experimental plant *Arabidopsis thaliana* re-phases its circadian clock to assist the development of lateral roots. Plants lacking or over expressing core circadian rhythm showed defects in their [root](#) systems.

This research, carried out by a team of plant biologists, statisticians and bioinformatics experts, in the Centre for Plant Integrative Biology, suggests that [plants](#) can control their physiological processes to encourage [root growth](#) to maximise the extraction of nutrients for

growth and development.

The study found that to regulate the development of new [lateral roots](#) their circadian clock oscillates in a phase independent of the circadian clock in other root and shoot tissues. The plant hormone and signalling molecule auxin is a key player in this process.

Dr Ute Voss, in the School of Biosciences, said: "Auxin re-programmes the overlying [cells](#) to undergo cell separation and facilitate the emergence of the new lateral root organ. We found that the circadian clock is re-phased during this process to regulate the release of auxin-related components to control the rate at which the new lateral root emerges. Disrupting the clock 'settings' led to impaired growth."

The [circadian clock](#) plays a key role in controlling plant growth and development but there's growing evidence that individual cells can 'synchronise' their clocks with other cells to coordinate growth and development.

Dr Michael Wilson, Bioinformatics Research Fellow in the School of Biosciences, said:

"This is another unrecognised mechanism regulating root architecture. The interplay between water and roots systems architecture is a source of much research at the moment and this is another variable to bear in mind."

Professor Malcolm Bennett, Chair of Plant Science at The University of Nottingham and Director of the Centre for Plant Integrative Biology, said: "The cells surrounding a new lateral root need to respond in a coordinated way as it emerges from deep within the main root. We think this is why the circadian clocks of these cells synchronise with each other, acting akin to a piano metronome to ensure the [root cells](#)

coordinate their rhythms."

**More information:** The circadian clock rephases during lateral root organ initiation in *Arabidopsis thaliana*, *Nature Communications* 6, Article number: 7641 [DOI: 10.1038/ncomms8641](https://doi.org/10.1038/ncomms8641)

Provided by University of Nottingham

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