Video: Sunflowers move to internal rhythm

Biological clock choreographs plants' daily pursuit of sunlight.

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Sunflowers' daily dance

The blooms' movements are driven by growth in their stems, not sunlight.

HAGOP ATAMIAN

It is one of the great symbols of summer: a sunflower (*Helianthus annuus*) bending to track the path of the Sun from east to west, straining to make the most of each day. At night, the sunflower eases back towards the east in preparation for daybreak.

Yet these flowers are not responding simply to light, but also to an internal clock, researchers have found.

Plant biologists Hagop Atamian and Stacey Harmer of the University of California in Davis grew sunflowers in a field and then transferred them to growth chambers with a fixed overhead light that was always on. The plants continued their daily journey from east to west and back for several days after the transfer, suggesting that they were not responding only to the direction of the light, but their own timekeeper.

“It brings into question whether there's some sort of memory that's found within the plant that allows this regulation,” says Mark Belmonte, a plant biologist at the University of Mannitoba in Winnipeg, Canada, who was not involved with the study. ”This could be a very fine-tuned process.”

Atamian, who presented the results this week at the annual meeting of the American Society of Plant Biologists in Portland, Oregon, also showed that the sunflowers bend when one side of the stem grows faster than the other. Faster growth on the west side of the stem, for example, causes the plant to bend towards the east.

The researchers went on to study gene expression on each side of the plant. Atamian hopes to use this data to learn more about how a sunflower’s internal clock can alter growth on one side of the stem but not the other. “Somehow the same clock in the same organ is having opposite effects on opposite sides of the stem,” he says. “It’s a big open question.”

Other plants perform a similar diurnal dance, including agriculturally important crops such as soybeans, cotton and alfalfa. Such solar tracking has been shown to boost plant yield.

But sunflowers eventually weary of the waltz. Mature sunflowers stop tracking the Sun and stand straight — often facing the east, ready to soak up each new sunrise.

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