

# Mystery of why some sunflowers track the sun across skies solved

Help me grow

Ben Blackman, UC Berkeley

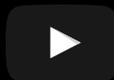
By Emily Benson

Here comes the sun. The heads of young sunflower plants — those with immature flowers — follow the sun during the day, then reverse course at night, so they're ready to face the dawn.

But no one knew how much of an advantage the plants were gaining from their daily dance, says Stacey Harmer at the University of California in Davis.

To find out, Harmer and her colleagues tethered some plants so they couldn't move, and rotated the pots of others so they were facing the wrong way in the morning, away from the sunrise.

They found that leaves of both groups of sunflowers were about 10 per cent smaller than leaves from plants that were allowed to follow the sun. "They're less efficient if they can't track," says Harmer.



To see whether the sunflowers' daily swings were tipped off by environmental cues or driven by an internal clock, the researchers rigged up a growth chamber with a row of lights that turned on and off sequentially, mimicking the movement of the sun. Using the lights, they created an artificial 30-hour day-night cycle.

During the 30-hour cycle, the sunflowers didn't move back and forth on a regular schedule. But when the team reset the lights to a 24-hour cycle, the plants began tracking the "sun", suggesting that an internal circadian rhythm is at least partially responsible for the daily motion.

## **Pollinators needed**

Once sunflowers bloom, their back-and-forth motion ceases, and they typically point toward the rising sun. To see if facing east was beneficial to the mature plants, the researchers rotated some sunflowers so they were facing west, then recorded how many bees and other insects visited the plants.

During the early morning, the east-facing flowers received about five times as many pollinators as the west-facing ones.

### **Sunflower temperatures change over a day**

Evan Brown, University of Virginia

"You can see the bees going crazy over the east-facing flowers and mostly ignoring the west-facing flowers," says Harmer. The east-facing plants warmed up more quickly than their west-facing counterparts, which could account for some of the difference, given that warmer flowers have previously been found to attract more pollinators.

"I'm continually astonished at how sophisticated plants are," says Harmer. "They're really masters of coping with the environment."

Watching sunflowers track the sun brings up two big questions: how can plants tell time, and how can they sense direction, says C. Robertson McClung at Dartmouth College in Hanover, New Hampshire.

"This study takes on this iconic plant, and then addresses these two really mysterious questions," says McClung. "And it shows how it works, and then shows it's actually important for the plant that it works."

Demonstrating that circadian rhythms help plants grow has been one of the "holy grails" of the field, says McClung. "And this is one of the best proofs that's out there at this point."

Journal reference: *Science*, DOI: 10.1126/science.aaf9793

Read more: Sunflower solar harvester provides power and water; Venus flytrap can count prey's steps to dissolve them alive

---

A shorter version of this article was published in *New Scientist* magazine on 13 August 2016