

## TRILOBITES

# This Is What It Sounds Like When Plants Cry

Scientists recorded the popping noises that plants make in response to stresses like dehydration or a cut.

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Humans have glorious ways of vocalizing discontent: We grumble, grouse, gripe, groan, moan. One might think airing complaints requires, at the very least, a mouth. But recent research from the plant kingdom shows that a mouth isn't essential.

Stressed plants make audible sounds that can be heard many feet away, and the type of sound corresponds with the kind of bad day they are having. The results were published Thursday in the journal *Cell*.

To be clear, the sounds made by harried plants are not the same as the anxious mumbling you might utter if you have a big deadline at work. The researchers suspect the nervous, popping noise is instead a byproduct of cavitation, when tiny bubbles burst and produce mini-shock waves inside the plant's vascular system, not unlike what happens in your joints when you crack your knuckles.

“Cavitation is the most likely explanation, at least for most of the sounds,” said Lilach Hadany, a biologist at Tel Aviv University in Israel. Plants interact with organisms that produce sounds all the time — like buzzing

bees — and also communicate with other life-forms, including other plants, by emitting chemicals, called volatiles. But when it came to research on plants detecting — or producing — audible sounds, the literature had been silent.

“One open question that bugged me,” Dr. Hadany said, “was the problem of plants and sounds.”

After she met Yossi Yovel, who was studying bat sounds at Tel Aviv, they decided to team up to tackle the question together. They focused on tomato and tobacco plants because they are easy to grow and have well-understood genetics.

Plants were placed in wooden soundproof boxes with two microphones pointing at their stems, ready to record anything from a subtle whisper to an outburst of slam poetry. The researchers found that not only did the plants make sounds, but that the plants also made much more of a ruckus when they were dehydrated or having their stems cut (simulating an herbivore attack).



An experimental setup with a cactus. Lilach Hadany

The researchers were able to pick up the same sounds from plants in a greenhouse, too. They have since detected sounds made by other greenery, such as grapevines and wheat.

The vexed vegetables didn't air their grievances randomly but rather made specific complaints that matched up with the type of stresses they were under. A machine-learning program could correctly tell, with 70 percent accuracy, whether the grumbling plant was thirsty or at risk of decapitation.

"That the plants are making different noises that have some information seems like the main contribution of this study," said Richard Karban, an ecologist at the University of California, Davis, who was not involved

with the research. “I think it will move the field forward.”

The peeved plants aren’t making sounds that humans can hear — they’re too high-pitched, and researchers had to process them into sounds you can hear now. But the sounds do fall within the hearing range of other animals, like mice and moths. Given that the popping sounds can be heard up to 16 feet away, there’s also the question of whether other plants could be listening in to their neighbors’ drama.

Dr. Hadany’s group previously showed in a 2019 paper that some flowers respond to the sound of approaching pollinators by making more nectar. Finding out whether any other organisms respond to the noises made by stressed-out plants, as well as potentially using the information such noises suggest about the plants’ conditions, is an important next step.

Dr. Karban could see other plant biologists raising doubts about the implications of the results but said that they highlighted the surprising sophistication of plants. As sedentary organisms, plants are “exquisitely aware of their environments,” he said.

And after reading about this study, you may find yourself wondering whether the houseplant on your windowsill is plaintively wailing about the conditions you’ve left it in.

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