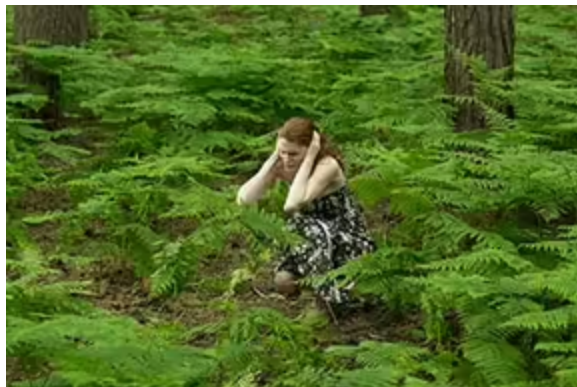


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# Do Plants Feel Pain? A Primer on Plant Neurobiology

By: [Laurie L. Dove](#) & [Desiree Bowie](#) | Updated: Sep 7, 2023



The smell we associate with freshly cut grass is actually a chemical distress call. What if we could hear it?

MICHAEL

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Few moments evoke a sense of summer like catching a whiff of freshly cut grass. For many people, it's a pleasant sign that warmer temperatures are here to stay. However,

for the grass, this scent signals an entirely different story.

The smell we associate with freshly cut grass is actually a chemical distress call, one used by plants to beg nearby critters to save them from attack (usually it's an affront by insects, but in this case, it's lawnmower blades). This defense response beckons the question: **Do plants feel pain?**

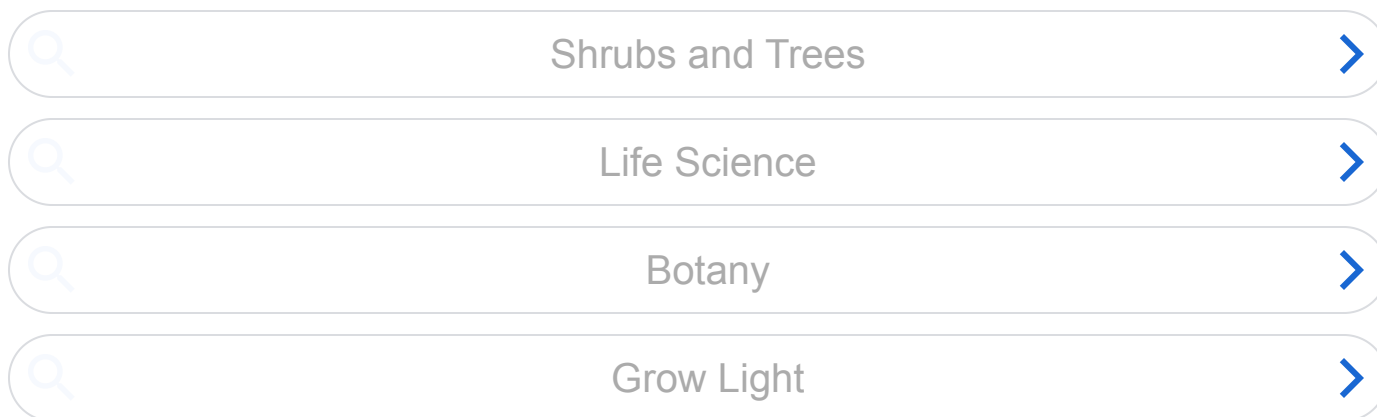
The answer is a bit complicated because they don't feel pain like us humans do, but some plant scientists posit that they may feel pain in their own way. Let's dive into some plant neurobiology to figure out how these multicellular organisms might be experiencing pain.

## **Nervous Systems**

Pain perception is typically associated with living organisms that possess a nervous system, which includes specialized sensory receptors, neurons and regions of the brain responsible for processing sensory information. Only, plants don't have a brain or nervous system — but they do exhibit complex signaling and communication systems that allow them to respond to their environment.

Plants use a variety of chemical and electrical signals to sense changes in light, gravity, temperature and touch. They can also respond to external stimuli by growing toward or away from them, adjusting their root and shoot growth and producing defense compounds against predators. These responses are managed through intricate biochemical pathways and plant-signaling molecules like hormones.

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## Chemical Defenses

While plants are not chatty in a conventional human way, they use chemical communication to protect themselves. When danger strikes — whether it's landscaping equipment, a hungry caterpillar or other living organisms — plants can't lift their roots and run. They must fight where they stand. To protect themselves, plants employ a volley of molecular responses.

These chemical communications can be used to poison an enemy, alert surrounding plants to potential dangers or attract helpful insects to perform needed services [source: [Krulwich](#)].

Sometimes, a plant's molecular defense plays double duty. For example, plants that produce caffeine use the chemical as self-defense, but it also gives bees a [caffeine](#) buzz. The caffeinated bees treat the plant like it's the corner coffee shop, returning again and again and leaving their pollination services as payment.

## A Complex Biological Network

As they grow, plants can alter their trajectories to avoid obstacles or reach for support with their tendrils. This activity stems from a complex biological network distributed through the plants' roots, leaves and stems that helps them propagate, grow and survive. Trees in a forest, for instance, can warn their relatives of insect attacks.

One scientist injected fir trees with radioactive carbon isotopes; within a few days, the carbon had been sent from tree to tree until every tree in the 30-meter-square area was connected. The scientist learned that the mature trees "communicated" to the network to share nutrients through their root systems to feed nearby seedlings until they were tall enough to take in light for themselves [source: [Pollan](#)].

## Screaming Cucumbers

While we're on the subject of unique communication methods, let's take a look at some mildly unsettling scientific findings.

According to researchers at the Institute for Applied Physics at the University of Bonn in Germany, plants release gases that are the equivalent of crying out in pain. Using a laser-powered [microphone](#), researchers have picked up sound waves produced by plants releasing gases when cut or injured.

Although not audible to the human ear, the secret voices of plants have revealed that cucumbers scream when they are sick, and flowers whine when their leaves are cut [source: [Deutsche Welle](#)]. And it's not just cucumbers that are making their voices heard.

## Stressed Tomato Plants

For a [2019 study](#) published in the journal *Cell*, researchers from Tel Aviv University placed microphones near tomato and tobacco plants that were dehydrated or damaged. They were able to detect ultrasonic sounds emitted by the plants from a distance of about four inches. These sounds ranged from 20 to 100 kilohertz, potentially detectable by certain organisms from several meters away.

However, you won't hear these screams while chilling out in the living room near your favorite basil plant because these sounds occur at ultrasonic frequencies beyond human hearing range. When adjusted to frequencies audible to human ears, these bursts of sound caused by stress resemble the sound of someone tap dancing on a field of bubble wrap.

While these ultrasonic bursts are beyond human hearing, they could potentially be perceived by mammals, insects and other plants in their natural environments, prompting corresponding reactions.

## Chewing Sounds Put Plants on High Alert

In a macabre turn of events, there's also evidence that plants can hear themselves being eaten. Researchers at the University of Missouri-Columbia found that plants understand and respond to chewing sounds made by caterpillars munching on them. As soon as the plants hear the noises, they respond with several defense mechanisms [source: [Feinberg](#)].

For some researchers, evidence of these complex communication systems — emitting noises via gas when in distress — signals that plants can feel some type of pain. Others argue that there cannot be pain without a brain and nervous system to register the feeling. But before you rethink your veggie medley, know that you're not engaging in any botanical torture because these plants are likely not experiencing pain like land animals, sea creatures or other animals.

Still, more scientists surmise that plants can exhibit intelligent behavior without possessing a brain or conscious awareness [source: [Pollan](#)].

## Plant Consciousness May Be a Real Thing

Research has revealed [surprising insights](#) into plant behavior, challenging assumptions about their capabilities. Plants, like the *Mimosa pudica*, can be anesthetized with substances like ether or lidocaine, causing them to stop responding to stimuli and suppressing their electrical activity.

This has sparked questions about whether this "sleep" state implies awareness or consciousness in plants. A small group of researchers, including Paco Calvo at the University of Murcia, are taking this idea seriously.

Plants exhibit sophisticated abilities, sensing and reacting to various environmental aspects, engaging in communication and complex interactions with other species. While some behaviors are instinctual, others might hint at a form of cognition. Calvo's work focuses on identifying factors indicative of cognitive behavior in plants, such as flexibility, prediction and goal-directedness.

*This article was updated in conjunction with AI technology, then fact-checked and edited by a HowStuffWorks editor.*

## Plants Feel Pain FAQ

### **Do plants feel pain?**

Plants don't have a central nervous system, pain receptors, nerves or a brain, so they likely can't feel pain in the same way that humans or other life forms do.

### **Do plants scream when you cut them?**

Research suggests that plants have a molecular defense in which they release a chemical that's a form of distress call when they're cut or sick.

### **Do plants make noises when you eat them?**

According to research done by the University of Missouri-Columbia, plants can hear themselves being eaten. They respond to chewing by making noises and initiating different defense mechanisms.

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