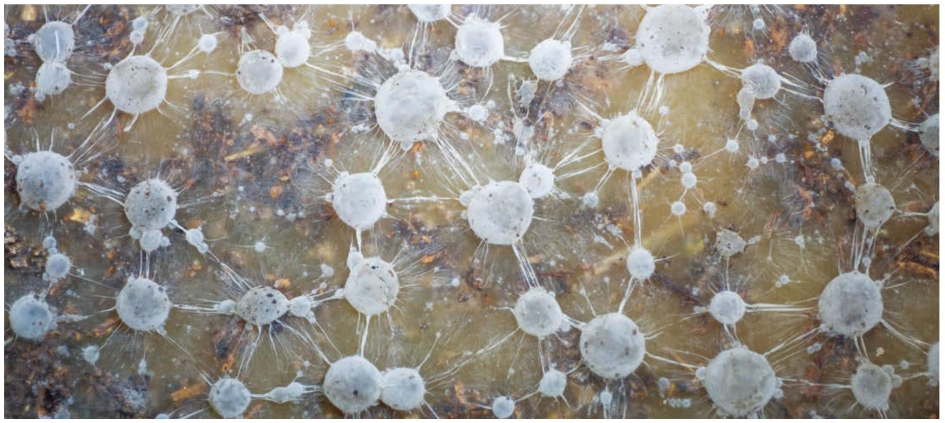
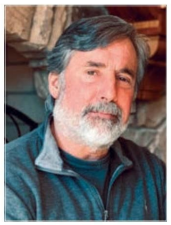
The Amazing, Incredible Talking Plants



Eat Your View



By ROBERT TURNER

There is another world below and around us, vast and invisible but entirely connected with our own. The world I'm referring to is the interconnected relationships between tiny microbes in the soil and plant life. But here is where it gets weird. Microscopic organisms and plants communicate with each other.

Dr. Suzanne Simard (*Finding the Mother Tree: Discovering the Wisdom of the Forest*) was one of the first researchers to promote the idea of plant and tree communication that supports the exchange of carbon, water, nutrients and defense against predators for the common good of all in an ecosystem.

At first ridiculed for her work 30 years ago, she is today recognized as one of the first to understand the amazing network, a web of mycorrhizal fungi that breaches gaps between root systems and helps transfer information, nutrients and water between plants.

Simard discovered that birch and Douglas fir trees, in a strange twist of interspecies cooperation, share carbon using the fungal web. She showed how one species will trade or loan sugars to the other during different seasons.

Her fascinating research also identified what are called "mother trees" in the forest. These are the largest trees and act as central hubs for below-ground mycorrhizal networks through which a mother tree supports seedlings by exposing them to fungi and supplying them with nutrients. Simard also found that mother trees change their root structure to make room for baby trees. *Avatar*'s mother tree is not that far removed from reality, and everything is connected.

The First World-Wide Web: Mycorrhizal Fungi

Mycorrhiza is the fungus that grows in a symbiotic relationship with plant roots, and it's everywhere. Mycorrhizae play important roles in plant nutrition, soil biology and soil chemistry because these specialized fungi effectively extend the plant root system with mycelium, a web of long microscopic filaments called hyphae. A mycelium's surface area can be up to 100 times greater than that of the plant root itself. This "secondary root system" absorbs valuable nutrients and water that otherwise are unreachable or unavailable to the plant. In return, the fungus receives all of its necessary carbohydrates from the host plant.

A plant is like a circuit board connected to the internet, giving and getting information from the mycorrhizal web of life. Mycorrhiza will fuse itself so closely to the roots of a plant that it is difficult to tell where one species begins and the other ends. An aspen forest is not made up of hundreds of trees but is actually one living organism stretching across the landscape. Aspen trees are interconnected by vast root systems and fungi that allow them to share resources.

When Douglas fir roots meet underground, they often fuse and the trees join vascular systems. Connected by thousands of miles of fungal web, whole forests feed and heal each other, often taking care of younger and unhealthy trees. There are no individuals trying to out-compete others, as was the thinking, but endless cooperation within and between species in a form of green socialism.

How Plants Talk

Through chemical and electrochemical signals, plants can warn each other about a nearby grazing deer, or sound the alarm about an insect invasion. In their own mysterious way, plants can cry for help, warn a predator to get away or signal neighbors to start conserving water—all spoken in a language that we're just now beginning to translate.

Research shows that plants communicate with each other in a variety of ways, including touch, smell, chemical transmission and electrical signals. For example, when a bug chews on a leaf, the host plant can respond by releasing organic compounds into the air. Other plants can detect these airborne signals and ramp up production of chemical defenses in response. This distress signal belongs to a group of chemicals called volatiles, which can travel far. Many plants send out a hormone called jasmonic acid, which tells nearby plants to start producing a toxin to defend themselves. Predator bugs have evolved to recognize that chemical smell and come looking for that herbivore bug for lunch. The plant attracts predators to come to its defense.

We can detect this distress signal with freshly mowed grass. Cut grass releases gaseous chemicals that scientists now believe are a sweet-smelling signal to warn nearby plants of impending danger.

We know that modern industrial agriculture is harmful to microbial life in the soil because it rips apart the mycorrhizal web and disrupts carbon storage. Heavy cultivation (tilling) or the use of synthetic nitrogen fertilizers reduces the fungal population. Pesticides can have harmful effects on helpful bacteria.

Organic and regenerative agriculture, on the other hand, helps protect and build microbes that play a major role in plant health and carbon sequestration. Sustainable carbon storage practices include low-till or no-till agriculture, cover crops, composting, crop rotations and getting cattle back on pasture in a rotational pasturing program. These practices build microbial life, pulling carbon out of the atmosphere and storing it back in the ground—where it belongs.

Robert Turner is a farmer and author of Lewis Mumford and the Food Fighters: A Food Revolution in America. *Learn more at EatYourView.com. Visit MotherTreeProject.org to learn more or to donate to ongoing research.*