# ROOT CAUSE

**WHEN IT COMES TO MYCORRHIZAE, A LOT OF LANDSCAPE ARCHITECTS ARE STILL IN THE DARK.**

BY KYNA RUBIN

**ABOVE**
As part of an urban landscape in Honolulu, Rick Quinn, ASLA, clustered native plants to spur interplant cooperation and interaction with the soil microbiome.

COURTESY RICK QUINN, ASLA

Forest researchers and organic farmers who have studied permaculture long have understood that naturally occurring mycorrhizae are vital to a landscape's ecological health. These underground webs—mutually beneficial associations between fungi and roots—are part of nature's way of protecting trees and plants from drought, pests, and disease. But practical knowledge about how to harness mycorrhizae is lacking among landscape architects, says Rick Quinn, ASLA, a principal at HHF Planners in Honolulu.

When Quinn studied landscape architecture in the 1970s, he says, he learned about ecosystem functions. "But once we got into the realities of private practice, we set all that aside," he says. The reality is "nurseries with limited plant material grown in sterilized conditions, contractors used to installing in certain ways, planting in nonnative soils, overwatering and overfertilizing, then getting insect problems. You just fall into that routine." This ornamental-garden approach works, he says, but requires a lot of fertilizer, water, and chemicals.

Quinn's new technique is designed to encourage natural mycorrhizae associations. When possible, he purchases plants from multiple nurseries with varying microclimates and soil conditions that can provide an assortment of beneficial microorganisms. He has also adopted unconventional watering schedules. In summer, he waters deeply (half an inch of water) once a week, and does a shallow watering (an eighth of an inch) three times a week. The resulting soil moisture fluctuations place just enough stress on plants to nudge their roots into forming organic, beneficial relationships with fungi.

In California, Josiah Cain, ASLA, of Sherwood Design Engineers in San Francisco, has applied strategies pioneered by permaculture experts on several rural restoration and farm projects, using vegetation, bioswales, and soil inoculated with fungi to protect water bodies from bacteria associated with horses and cows. Cain says urban landscapes with engineered soils could benefit from the same approach.

Developing commercial mycorrhizae products is a challenge because pinpointing which fungi are beneficial to which plants is a tricky business, says Nicole Hynson, head of a University of Hawaii lab that studies plant–fungus interactions. The same fungus, depending on the situation, can be beneficial, neutral, or parasitic.

Still, crossover from science to practice is possible, Hynson says. She has led workshops for nonprofit and public agency staff on techniques for culturing and inoculating plants with symbiotic microorganisms. "These types of efforts could easily be transferred to landscape architecture," she says, though applying these practices requires buy-in on both sides: Some land managers she's worked with have concerns about introducing wild microbes into their greenhouses for fear of pathogens.

Even eager learners like Quinn find the breadth of knowledge needed to understand mycorrhizae challenging. "To really do this you almost need to be a soil scientist, an entomologist, a fungal expert, and a botanist," he says. Soil science research has not been collated and translated in ways applicable to landscape architecture, Quinn says. Practitioners might be inclined toward a whole-system view if the science were made more accessible. Landscape architects, he says, need "to reach out to these other disciplines and say, 'You've done a lot for agriculture. Help us [learn] how to apply this new understanding.'" ●