INTERCEPTION!

WHEN IT COMES TO CAPTURING RAINFALL, NOT ALL TREES ARE EQUAL.

RIGHT
Three of the species analyzed in the study (from top): holly oak, Canary Island pine, and Bradford pear. The complexity of a tree's leaf and stem surfaces affects its interception potential.

QINGFU XIAO

"Trees are a strategy in the whole green infrastructure tool kit," Greg McPherson says in his bright tenor over the phone, "but the science that underpins that is really in its infancy." McPherson, a research forester with the U.S. Forest Service, is speaking from an outpost of the Pacific Southwest Research Station in Davis, California. He says although experts have known that surface storage—the amount of water temporarily stored on a tree's leaves and branches—is dictated by a tree's architecture and the physical characteristics of its leaves and stems, green infrastructure accounting tools often assume a surface water storage capacity of one millimeter, regardless of species.

Using a rainfall simulator to test 20 tree species commonly found in Davis, McPherson and the water research scientist Qingfu Xiao found that some species can store nearly twice that amount while others store little more than half. In the experiment, which was published in the *Journal of Environmental Quality* this year, blue spruce *(Picea pungens)* held the most water, with a mean value of 1.81 mm. Crape myrtle *(Lagerstroemia indica)* held the least, with a mean value of 0.59 mm. Although actual interception will vary by region, foliation, the amount of rainfall, and the size of a tree's canopy, generally speaking, the more complex a tree's surfaces, the more rainfall it will trap. The Chinese pistache, for instance, has rigid compound leaves and a rough stem and rachis. "The complexity of that surface is pretty high," McPherson says. "As a result, you get a pretty efficient little storage device."

Though small, these differences could be significant in stormwater management equations. If the average storm event produces a half inch of rainfall, a tenth of an inch—about what a blue spruce intercepts—is 20 percent of the volume for that area. "That's a meaningful number," says James Urban, FASLA, a landscape architect and author who specializes in urban forests. "[But] our calculations for stormwater from the engineering community completely ignore this." Urban says the study also highlights the need for better tree maintenance. "When we plant a tree, we need to do everything we can to make sure that tree will be a real replacement for the trees that are fading out," he says. "That's when the issue of water interception really takes on stature. When you've got a tree [whose canopy] is 50 feet in diameter, it becomes a huge factor." ●