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HOME & GARDEN

The Grass Is Greener at Harvard

In the Garden

By ANNE RAVER SEPT. 23, 2009

Correction Appended

CAMBRIDGE, Mass.

THERE is an underground revolution spreading across Harvard University this fall. It's occurring under the soil and involves fungi, bacteria, microbes and roots, which are now fed with compost and compost tea rather than pesticides and synthetic nitrogen.

The results have so astounded university administrators that what started as a one-acre pilot project in Harvard Yard has spread organic practices through 25 acres on the campus.

"Our goal is to be fully organic on the 80 acres that we maintain within the next two years," said Wayne Carbone, Harvard's manager of landscape services.

Harvard's president, Drew Gilpin Faust, who last year started a university effort to reduce greenhouse gases by 30 percent by 2016, has adopted the organic program at Elmwood, the president's house on Brattle Street. Dr. Faust became intrigued by the effort last spring when she saw a display that the Harvard Yard Soils Restoration Project had set up outside her office.

"The lumps of soil showed how grass grew when treated with chemical fertilizers and how it looked when treated organically," she said. "You could really see the root systems and how different they were."

As the project proceeded, "and I saw the impact, I was really excited," Dr. Faust said. "I think it's an integral part of the larger effort to advance sustainability at Harvard."

The organically grown grass on campus is now green from the microbes that feed the soil, eliminating the use of synthetic nitrogen, the base of most commercial fertilizers. No herbicides or pesticides are used, either. Roots reach eight inches into soil that was once so compacted the trees planted in it were dying.

Like most college campuses, Harvard Yard takes a beating every day.

"At commencement, rain or shine, we have 10,000 people here," Mr. Carbone said, gazing at the expanse where chairs are traditionally set in front of Memorial Church. "We get about 6,000 to 8,000 people here every day."

But the microbial activity beneath their feet has now aerated the soil. Tree roots can breathe because they are absorbing nutrients and water. Newly planted oaks outside Mass Hall, a few steps from Harvard Square, are thriving.

Soil tests show the presence not only of beneficial bacteria and fungi but also of the micro-organisms that feed on them, recycling nitrogen back into the soil. This dog-eat-dog world underground also retains moisture.

Thanks to these efforts, the university has reduced the use of irrigation by 30 percent, according to Mr. Carbone, thus saving two million gallons of water a year.

And the 40-year-old orchards at Elmwood, which have been treated with compost tea, are recovering from leaf spot and apple scab, two ailments that had afflicted them.

"We can already see the leaf spot has receded, and the trees have a much more vibrant canopy," said Dr. Faust, who is composting her own yard and kitchen waste.

The project began in the spring of 2008. Eric T. Fleisher, the director of horticulture at the Battery Park City Parks Conservancy, was spending a year as a Loeb Fellow at Harvard's Graduate School of Design, and he teamed up with Mr. Carbone and his staff to see what microbes could do on one acre of battered soil in the Yard.

The project was helped on its way by Michael Van Valkenburgh, the landscape architect who designed public spaces such as Teardrop Park in Battery Park City and Brooklyn Bridge Park. Mr. Van Valkenburgh has taught at Harvard for two decades and oversees the care and replanting of trees in the historic Yard.

When Dr. Faust became president in 2007, she and Mr. Van Valkenburgh toured Harvard Yard and discussed how switching from synthetic chemicals to organics would reinvigorate the soil and everything that grew in it.

Mr. Van Valkenburgh, who grew up putting DDT on the family's vegetable plot, had seen how Mr. Fleisher's use of compost and teas had improved Battery Park City's 36-acre landscape, which thrives, despite heavy foot traffic, without the use of pesticides or synthetic fertilizers.

An organic approach requires a radical change in thinking.

"This is not a product-based program, it's knowledge-based," Mr. Fleisher said last week as he stood in front of Mass Hall, where the project began. Brandishing a long narrow spade that is often used to dig up trees and shrubs, he added, "This is our first diagnostic tool."

Mr. Fleisher handed the spade to Kieran Clyne, the horticulturist in charge of making compost at the Arnold Arboretum, an arm of the university, as well as brewing vats of compost tea in a Harvard-owned garage.

When the project started, Mr. Fleisher said, "the soil was so compacted, we could not dig past three inches."

But when Mr. Clyne stepped down on his spade this day, it went through the grass like the proverbial knife through butter. He made a core sample, a square of

turf and soil as wide and deep as his spade, then lifted it gently and laid it on the grass. The soil was dark and crumbly; the roots were six to eight inches long.

Lifting the core sample by its grassy top, he showed how the soil clung to the roots, another effect of all that microbial activity.

Healthy soil is a mixture of sand, silt and clay particles held together by the gums and gels formed by bacteria as well as by fungi and plant roots. These micro-organisms, as well as insects and earthworms, create the spaces through which air and water can trickle.

The test plot's new ability to absorb and hold water (thus reducing irrigation needs), coupled with the benefits of composting 500 tons of grass clippings, pruned branches, leaves and other material that was trucked off campus to the tune of $35,000 a year, quickly convinced Mr. Carbone that the program should be expanded.

"Now we're composting all that organic material at the Arnold Arboretum, so we don't have to pay someone else to truck it out," he said. "And we don't have to buy compost or fertilizers, so we're saving an additional $10,000 in those materials."

Organic growing techniques are so simple that any homeowner can get the hang of them. But to do so, it's necessary to learn some basic facts about the structure and biology of your particular soil. In an organic approach, one bag of chemicals does not fit all. And timing is key.

The first step, Mr. Fleisher said, is to take a core sample of your soil, and send some of it to a good testing laboratory, such as the one at the University of Massachusetts, or one recommended by your state university. A textural analysis will indicate the percentage of clay, silt and sand in your soil, and how well it drains. A complete nutrient analysis will tell you what elements and micronutrients the soil contains. Such tests cost from $13 to $75, and results are returned within a few weeks.

The next step is to do a simple percolation test. Use a shovel or a post-hole digger to make a hole 12 inches deep.

“Make one-inch markings on a stick and put that in the hole,” Mr. Clyne said.

Then fill the hole with water and let it drain for 30 minutes. “Then, fill up the hole again, and see how fast it drains,” he said.

One inch an hour is adequate for a home lawn.

Without good drainage, water and air cannot be properly absorbed by plant roots.

Also, “compaction wreaks havoc on your fungal communities,” Mr. Clyne said. And fungi are key to soil health.

There’s a give-and-take between fungi and plants, as the fungi consume carbohydrates exuded by plant roots and give back water, phosphorus and other minerals. Bacteria also consume carbohydrates. And they in turn are eaten by protozoa and other creatures that convert the bacteria’s protein into nitrogen, which feeds the plants.

Adding compost to soil gets that biological community cooking.

“Once you get that nutrient cycling system going,” Mr. Fleisher said, “it can produce 150 pounds of nitrogen an acre. With that kind of available nitrogen, why would you fertilize?”

Not everyone is repeating the mantra “green is the new crimson.”

“I don’t approve of that at all,” said the Rev. Peter J. Gomes as he stood in the front yard of his residence, Treadwell-Sparks House, where a little sign near the viburnum hedge announced that it was part of one of Harvard’s organic landscapes. He thinks the motto and the sign are “a lot of nonsense.”

Mr. Gomes, the minister at the school’s Memorial Church since 1970, said he planted most of the trees, shrubs and perennials here “with my own hands.” But he has always left the grass in Harvard’s hands. “As long as it looks good, I don’t want to know,” he said.

But after an enjoyable joust with Mr. Fleisher, who explained that using compost was “mimicking the laws of nature,” saving water and might even revive the rather spindly hedge, Mr. Gomes put down his sword, sort of.

“Anything that would make this a lush garden, “he said, “I’ll do it.”

To help laypeople unravel the mysteries of the soil in their own yard, Harvard has posted a kind of mini-course on its Web site www.uos.harvard.edu/fmo/landscape/organiclandscaping. It includes simple directions for building a compost pile hot enough to eat weed seeds, building a compost tea brewer, and brewing teas particularly suited for grass, perennials or woody plants.

Correction: October 1, 2009

An article and an accompanying picture caption last Thursday about the spread of organic gardening at Harvard referred incompletely to the Rev. Peter J. Gomes, whose residence, Treadwell-Sparks House, is part of the project. He is more widely known as the longtime minister at the university’s Memorial Church, not just as a professor and a minister. The caption also referred imprecisely to the location of his residence. It is considered part of the campus; Mr. Gomes does not live “near Harvard.”
Due to an online editing error, the credit for the photograph of a microscopic image of roots from an oak tree on Harvard Yard was incorrect. It was by Ben Wolfe.

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