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IN THE GARDEN

A Viable Alternative to Conventional Lawn? Cornell May Have Found One.

Cornell Botanic Gardens is testing sustainable options for replacing your backyard grass. The bonus: They don't need to be cut more than twice a year.

By Margaret Roach
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It's a grail of contemporary horticulture, a subject of inquiry for scientists and landscape designers alike: how to reinvent the estimated 40 million acres of lawn in the United States, shifting the emphasis toward native plants.

The promise? Less environmental damage and more biodiversity.

Because traditional lawn care is, at its essence, a perpetual fight against biodiversity, a war conducted with mower blades and chemicals. All of the numbers — the gallons of water wasted, the tons of pollution generated — tell us to stop.

But what should replace all of that mowed grass? The answer is not easy.

The native lawn at Cornell is dominated by two species of oat grass (Danthonia). F. Robert Wesley

At Cornell Botanic Gardens, in Ithaca, N.Y., Todd Bittner, a plant ecologist, and his colleagues took up the question almost 15 years ago, in a quarter-acre research project known as the native lawn demonstration area.

“Please *do* walk on these plants,” a sign tells visitors, explaining what’s going on underfoot: a test of “low-growing native plants” as an alternative to traditional lawn.

The goal is to identify species that provide “acceptable aesthetics” and can “tolerate moderate trampling,” Mr. Bittner said, but that, in every other way, differ from the various fescues, perennial ryegrass and Kentucky bluegrass that have been the mainstays of conventional lawns.

A successfully reimagined lawn will be sustainable and require minimal or no watering, said Mr. Bittner, who, as the director of natural areas for the botanic gardens, manages 3,600 acres, including about a third of the Cornell University campus.

It will not need fertilizer or pesticides, he said. And the new version will require mowing only once or twice a year, significantly reducing the more than 800 million gallons of gasoline used annually to fuel the country’s lawn mowers and resulting carbon dioxide emissions.

The Cornell project is also looking to identify plants that, once established, will require minimal hand weeding and will form a community that is at least 85 percent native, supporting a diversity of native insects and other animals.

Looking further ahead, Mr. Bittner has one more ask: that the substitute turf grass can be easily grown from seed, the way our current lawn grasses are.

That has been an obstacle with certain species of sedges (Carex), which have a low-growing, grasslike look, and have been a focus of other lawn-alternative studies, at Mt. Cuba Center in Delaware and elsewhere. But some of them, like Pennsylvania sedge (C. pensylvanica), “don’t grow readily by seed, and that’s a little bit of the hang-up,” Mr. Bittner said. “We wanted this to be something that people could replicate.”

In springtime, the quarter-acre lawn at Cornell welcomes wildflowers, both planted and self-sown. F. Robert Wesley

Cornell's Choice: Two Species of Danthonia

Researchers elsewhere have looked at various options for replacing the lawn, including wildflower meadows and prairie-style communities dominated by larger grasses, as well as ground covers like nonnative white clover and low-mow fescue mixes.

To anchor the project at Cornell, the team at the botanic gardens didn't have to look far. Krissy Boys, a staff horticulturist, had an idea, inspired by some low-growing native grass.

"I fell in love with Danthonia the moment I met it growing along an old seasonal road," she said.

She was referring to two members of a genus of bunch grasses, commonly called oat grass, that she had noticed under power lines, in old city parks and in cemeteries — growing in unimproved soil with only occasional mowing.

"The combination of native species and a lawn aesthetic provided the inspiration for creating the native lawn," she said.

Poverty oat grass (Danthonia spicata), which the Lady Bird Johnson Wildflower Center notes is native in 45 states, as well as parts of Canada and Mexico, and flattened oat grass (Danthonia compressa), an Eastern species, became the two dominant species in Cornell's lawn.

Like our current turf-grass species, Danthonia are cool-season growers, putting out new growth early in spring and again in fall. They are naturally low-growing: D. spicata is about a foot tall, and D. compressa grows to maybe 18 inches. In flower, their spikelets extend another six to 10 inches above the foliage.

Three species of Viola are among the newcomers that have seeded their way into the native lawn, the common blue violet among them (Viola sororia). F. Robert Wesley

The original native lawn planting at Cornell, in 2009, included more than 20 species of plants, with 11 grasses and sedges among them — a designed plant community modeled after natural grass- and sedge-dominated ones.

The plants were sown, or introduced as small plugs, into ground from which the turf had been stripped, removing a lot of organic matter and fertility. The remaining soil was amended with sand (and limestone dust in a subsequent phase) to make conditions more well-drained and less fertile — the antithesis of what we have offered conventional lawns, and what they rely upon at great environmental cost.

The conditions at Cornell also intentionally disfavored turf-grass weeds, which prefer the rich, loamy soil our lawns typically inhabit.

“That was us tipping the scales to make it less conducive to the turf weeds and more conducive to the native plants,” Mr. Bittner said. “It also created an environment that didn’t require them to be watered and fertilized.”

Not everything on the original plant list is still part of Cornell’s native lawn. Native bluets (Houstonia caerulea), with their low tufts of tiny flowers, served as a pioneer species but have since disappeared. F. Robert Wesley

An Evolving Scene, Courtesy of Succession

When going native, prepare for a fluid picture.

As in any natural community, succession rules. Not everything on Cornell’s original plant list has survived — and newcomers have seeded their way in. Various native asters, three species of Viola and beebalm (Monarda fistulosa) are among the many serendipitous arrivals.

The researchers are “embracing benign nonnatives,” Mr. Bittner said, including volunteer white clover (Trifolium repens), self-heal (Prunella vulgaris ssp. vulgaris), St. John’s wort (Hypericum perforatum) and some little buttercups (Ranunculus acris).

“I say benign, but some of them actually provide some benefit, like some pollinator habitat,” he continued. “And what’s actually key in the native lawn is to promote diversity.”

Gone, though, are natives like bluets (Houstonia caerulea), with their low tufts of tiny flowers. Columbine (Aquilegia canadensis) and wild geranium (Geranium maculatum) have also disappeared.

“The Houstonia loved it the first few years. It was phenomenal and breathtaking,” Mr. Bittner said. “It acted as an early successional species, but eventually was outcompeted, we think. But there’s also a role for plants in ecological communities to ebb and flow. You want to have these pioneer species, and then the ones that are going to come on later.”

One perennial that has done especially well is hairy beardtongue (Penstemon hirsutus), whose little lavender-pink tubular flowers can attract an array of pollinators, including long-tongued bees and butterflies, as well as hummingbirds.

Such animal interactions have been a big win. University entomologists report observing nearly four times as many insect families in the native lawn as they do in traditional turf-grass areas. On a single day, they have seen as many as 36 families there.

“We had pollinators, we had herbivores, we had predators, we had parasitoids — this complex web of this insect community that mimicked nature,” Mr. Bittner said. “Which was one of our goals in establishing the native lawn, to create this beneficial native-plant habitat. It far exceeded our expectations, in numbers and complexity.”

One perennial that has done especially well: hairy beardtongue (Penstemon hirsutus), whose lavender-pink tubular flowers attract pollinators. F. Robert Wesley

Get Out Your Scythe (or Weed Whacker)

The other good news is the sharp reduction in mowing. Once this kind of lawn is established, only a few hours of care is required annually — maybe a cutting or two.

To achieve the look of a lawn rather than a meadow, you mow "to control the height to what you are comfortable with, with however frequent a summer regimen to reach the height you want aesthetically," Mr. Bittner said.

"Just don't mow it too short," he advised, suggesting a minimum of six to eight inches.

One wrinkle is that traditional tools won't do the job, because their blades can't be set that high. So get out the weed whacker. This year, the garden staff wielded a scythe, too.

One thing they don't mow (or walk on): the Eastern prickly pear cactus (Opuntia cespitosa), one of the more surprising New York natives to make itself at home in this new take on the lawn.

One surprising New York native that has made itself at home in the native lawn: the Eastern prickly pear cactus (Opuntia cespitosa). F. Robert Wesley

So can you try this at home?

Danthonia seed is not on garden-center shelves yet, but the seed and plugs are sold by a few native-plant specialty companies.

“There’s a chicken-and-egg to this to begin with,” Mr. Bittner said. “There has to be interest from the public and consumer demand. And then there has to be the supply component.”

Cornell Botanic Gardens is trying to help change that by participating in the Northeast Seed Network, a collaborative effort with other institutions, commercial nurseries and seed companies to expand the availability of locally sourced seed. To that end, the native lawn team delays mowing until after seed is collected, pushing their annual maintenance to late July or early August.

The bigger, 40-million-acre end game is ever top of mind.

As Mr. Bittner put it: “Converting turf-grass lawns to something more sustainable is an action every homeowner can take to collectively address the climate crisis and give nature a helping hand.”

Margaret Roach is the creator of the website and podcast A Way to Garden, and a book of the same name.