OREGON STATE UNIVERSITY RESEARCHER STEVE STRAUSS IS ENGINEERING TREES THAT MIGHT HELP SAVE THE PLANET. SO WHY DO SO MANY GREENIES WANT TO STOP HIM?

BRANCH SCIENCE

BY DAVID WOLMAN
PHOTOGRAPHS BY LINCOLN BARBOUR

Steve Strauss stands in a grove of genetically modified poplar trees near Corvallis.
A SOFT AUTUMN RAIN HAS BEGUN TO FALL, droplets drumming on the silver Volvo Vqo’s windshield as Oregon State University forest biotechnology professor Steve Strauss and I arrive at a farm just outside of Corvallis. The tires crunch against gravel as we slow to a stop beside a gate marking the entrance to the field road. A hawk circles overhead. “Over there,” Strauss says, pointing across the field to where the flat land meets a stand of several hundred poplar trees. To the untrained eye, the trees look entirely unremarkable: tall, thin poplars with yellowing leaves. But to many self-appointed guardians of the world’s native forests, they are freakish, alien, and dangerous. These trees are—deep breath now—GMOs, genetically modified organisms. That three-letter acronym, GMO, is enough to ignite emotions on par with words like Guantánamo, nuclear proliferation, or abortion.

In the eyes of most agriculture, policy, and biotechnology watch-ers, the Pacific Northwest is far from the epicenter of the GMO debate. Most of the GM, or genetically modified, crops grown in the United States—primarily corn, soy, canola, and cotton—are farmed in the Midwest and the South. But Oregon may turn out to have a pivotal role in the longer history of this science, either as home base for a brilliant GMO innovator whose research helps to save the planet, or as the stage for a screwup that would fore-shadow the downfall of this potentially valuable technology.

To explain what happened back in 2003.

STRAUSS’S PROJECTS HAVE INCLUDED EXPERIMENTS LIKE BREEDING TREES THAT REQUIRE LESS WATER, TOLERATE SALTIER SOIL, GROW FASTER, OR COULD MORE EFFICIENTLY BE USED FOR GREEN FUELS OF THE FUTURE.
A windy summer afternoon was all it took. The Ohio-based grass-seed and garden-supply giant Scotts (now Scotts Miracle-Gro) had developed a transgenic variety of grass. Creeping bentgrass—bentgrass that has been sunken into the soil by the wind—doesn’t just take flight and manage to take root almost anywhere. Not only that, but there is already evidence that the “wind event,” or, according to locals, “dust devil”—a tornado-like whirlwind common during summer in the high desert. Scotts had instituted a “dust devil” program to see how much of a shadow the transgenic grass cast. The Dust Devil Project found that, during the trials found that, among the 1,500 acres that had been seeded, 5% of the grass had been blown away. “Let’s be perfectly clear: there has been no problem with seed from the contamination event. Nothing got into our containers or shipments to any of our customers. That is just critical,” he says. Creeping bentgrass is one of the newest varieties of grass to hit the market. “...it means the mountains would provide an effective ecological buffer. Still, 400 acres is a large test area. As Jim King, the company’s vice president of corporate affairs, put it, Scotts was “proactively pursuing deregulation, so that the day they got approval, they’d have to sell.” But the push to combine experiment with sales production backfired. Willamette Valley farms were well out of range of the test site, but seeds that didn’t mean the grass wouldn’t spread. Trouble kicked up with what was euphemistically identified as a “wind event”—or, according to locals, a “dust devil”—a tornado-like whirlwind common during summer in the high desert. Scotts had instituted a number of controls to keep the transgenic grass from migrating, but to no avail. (In fact, an outside study conducted during the trials found that, even before the wind event, a Scotts pollin had already traveled 13 miles outside the control area.) Tiny seeds carried by the wind were landed outside the lines that had been neatly penciled onto county maps. Seeds that took flight and managed to take root, assuming they survive hazards like trampling or drought, keep coming back year after year, just like other wild perennial weeds. Scotts will send their seeds up into the wind. Not only that, but there is already evidence that the grass cross-pollinated with other species, passing on the trait of Roundup resistance to other area grasses.

The headlines about GM bentgrass establishing itself in the wild spread quickly: “Smoking Grass: A US Study of Frankenstein Crops Spells Trouble for Agriculture,” reported the Dutch vegetable-seed multinational Biofuteco. “If you ever send us GM any- thng in a bag of carrot seed, it’s on you.” “That put the fear of God in me,” says Weber. “This was not something to tiffle with.”

To understand the uproar over GMOs, one must first understand the science behind genetic engineering. With that baseline, most conversations about GMOs quickly devolve into shouting feasts between stereotyped extremes.

For starters, genetic engineering is nothing new. Humans have been crossingbreeding different plant varieties for millennia, a process that has developed crops capable of withstanding greater adversity and suited to their environment. Over the millennia, people have crossbreed crops to successfully develop crops from corn to tomatoes that are bigger, tastier, and more resistant to disease. Such trait refinement is the result of years of research and development, which is the essence of modern agriculture. The result of this process is the creation of a new strain—what the public calls a GMO. When we talk about GMOs, we’re really talking about a plant of our choosing. 

But the mid-20th century, we got better at breeding things thanks to two developments: irradiation and, later, gene splicing. Irradi-ation—bombarding the genome of an organism with radiation—results in random DNA mutations, in effect, pulling the handle of the slot machine more quickly. In a 2002 paper published in Nature Biotechn-ology, Strauss and his co-authors point out that more than 2,200 crop varieties are on the market “that had an irradiation-induced mutation step in their pedigrees.” Yet none of these crop varieties—Rio Red seedless grapefruit, semi-dwarf rice, biofortified tomatoes—are considered GMOs by opposition groups, government regulators, or your local supermarket.

What is a GMO? It’s the product of a specific technique. In the past few decades, scientists have learned how to cut and paste genes from one organism to another with remarkable precision. This ability is the essence of genetic engineer- ing—a process that has been the driving force behind the modern-day DNA splicer.

CATS & DOGS

The Allerica Lifestyle Pets company genetically selects dogs and cats to prevent animal allergy-causing proteins from their skin and salivary glands. BenefIt S: Drastically reduces pet allergy symptoms in humans

The evidence is to the contrary. We have been consuming GM foods for more than a decade, and a mountain of studies about the possible health consequences have to date revealed no threat or harm to human health. Today, more than 150 million acres of farmland in the United States are planted with GM corn, soy, cotton, squash, papaya, alfalfa, sugar beet, and canola, and an estimated 70 percent of all products on supermarket shelves are modified by some GM ingredients, such as corn syrup or canola oil. And although amber waves of GM grain may conflict with our Michael Pollan–inspired fantasy of little family farms everywhere, GMOs may be greener than you think. The journal AgBioForum has estimated that GM crops reduce pesticide use by nearly 250,000 tons, and can also help reduce greenhouse gas emis-sions, because farmland planted with crops requires less tilling. Less tilling means more carbon dioxide remains locked in the ground, and diesel tractors spend less time spewing exhaust.

Nevertheless, anti-GMO activists have at the ready scattered studies that reinforce their belief that this technology is dangerous. One favor- ite, conducted by health researchers in Austria, found reduced fertility rates in third- and fourth-generation mice that had eaten GM corn. (“We do not believe that GMOs have been demon-strated safe for human health and for the environment,” explains Rick North, an educator who leads the Campaig-ns for Safe Food at Oregon Physi- cians for Social Responsibility. Not- ing that he’s not an anti-technology “luddite,” North argues—as do many rural farmers and concerned consumers—that the prospect of negative conse- quences from GM technology is rea-sonable enough to invest in this area of agricultural science. It’s really about what he calls “the evidence of what we don’t know.”

A small number of studies, how-ev-er, taken together with the earnest number of anti-GMO activists who have concluded that the Gmos currently on the market are safe to consume, are the result of those institutions and organizations that had concluded that the Gmos currently on the market are not harmful to the environment or world health: the National Academy of Sciences, Britain’s...
The sulphur smell we sometimes wake up to in Portland? That’s from the sulphur mill in Camas, Washington. A few years ago, Strauss set out to test whether trees could be planted next to the sulphur mill to see if they would filter the problem. His test plots in the field were validated by the data. “This experiment helped us get past the hype of the low-lignin mineral tree,” Strauss says. It also exemplified the incremental reality of research: try something, learn a few facts, try something a little different, learn something more. Yet, even if your trees aren’t freakish-super-trees poised to take over the forest (they’re actually the opposite), too winy to do much of anything), and if valuable information was gleaned from the results, why does he request that I not record our exact location?

Because his science is under attack, literally. The eco-insurgents vandalized trees in a similar test plot. Ironically, many of the dam-aged trees were not genetically engineered varieties; the attackers couldn’t tell the difference. This time, the incident, Strauss was a portrait of upbeat resilience. “The damage to our research program is actually fairly modest,” he told OSU’s news service. “Most of the older trees had already provided the data we were looking for, so they can be removed. The research was com-ing along quite well, and the results were very promising.”

Personally, though, Strauss was shaken. A few weeks after the van-dalism, he was at a conference with George Weyerhaeuser, then senior vice president of technology for pulp and paper giant Weyerhaeuser, and great-great grandson of one of the firm’s founders. His company has lent support to Strauss’ work, but not to Weyerhaeuser, so Strauss was shocked when he heard the news. During dinner at the swank Cliff House restaurant overlooking Puget Sound, Weyerhaeuser could tell that Strauss was downcast. And bit-tersweet to say, but the Weyerhaeuser was really wondering about the world,” he says. “I think he means his on the side that’s that’s my side, is driving the United Nations survey and he’s a strong believer that genes could be cast in the lot with the greedy capitalists like me, who presumably just don’t care.”

Weyerhaeuser, however, tells Strauss that someday people would value his work on social and spiritual benefits, but he now concedes that he “may have been overly optimistic.” Eight years later, the public perception of this research is largely unchanged. According to the co-director of the Genetically Modified Project, genetically modified trees “pose what many consider to be the most serious threat to the world’s remaining forest native forests since the invention of the chainsaw.”

Yet, with such stand-out claims, Strauss says he doesn’t mind being vilified by zealots—“whacktivists,” he calls them. What makes him com-fallen is just how much the public has subscribed to the whacktivist ethos with no apparent interest in evidence-based analysis—and the ramifications that has had on his ability to conduct research.

A decade ago, some of Strauss’ transgenic trees were grown on small test sites along the Columbia River near Ro-Ge. Until 2001, some of these plots were owned by the James River Conservation Project, a non-profit project was being conducted by the Tree Biosafety and Genomics Research Cooperative, which Strauss is a leading member. But GreenWood Resources, the global giant, inherited those survival from the project that owns roughly 22,000 acres of popular plantations throughout the state and now owns these plots, was not willing to host Strauss’ transgen-ic research. (The trees were in fact grown on land that was closed to the public.) Strauss was shocked. But it was worth it, Strauss says, for the results. “I was happy with the results,” he says.

He was a portrait of upbeat resilience. But the damage to our research program is actually fairly modest,” he told OSU’s news service. “Most of the older trees had already provided the data we were looking for, so they can be removed. The research was com-ing along quite well, and the results were very promising.”

Personally, though, Strauss was shaken. A few weeks after the van-dalism, he was at a conference with George Weyerhaeuser, then senior vice president of technology for pulp and paper giant Weyerhaeuser, and great-great grandson of one of the firm’s founders. His company has lent support to Strauss’ work, but not to Weyerhaeuser, so Strauss was shocked when he heard the news. During dinner at the swank Cliff House restaurant overlooking Puget Sound, Weyerhaeuser could tell that Strauss was downcast. And bit-tersweet to say, but the Weyerhaeuser was really wondering about the world,” he says. “I think he means his on the side that’s that’s my side, is driving the United Nations survey and he’s a strong believer that genes could be cast in the lot with the greedy capitalists like me, who presumably just don’t care.”

Weyerhaeuser, however, tells Strauss that someday people would value his work on social and spiritual benefits, but he now concedes that he “may have been overly optimistic.” Eight years later, the public perception of this research is largely unchanged. According to the co-director of the Genetically Modified Project, genetically modified trees “pose what many consider to be the most serious threat to the world’s remaining forest native forests since the invention of the chainsaw.”

Yet, with such stand-out claims, Strauss says he doesn’t mind being vilified by zealots—“whacktivists,” he calls them. What makes him com-fallen is just how much the public has subscribed to the whacktivist ethos with no apparent interest in evidence-based analysis—and the ramifications that has had on his ability to conduct research.

A decade ago, some of Strauss’ transgenic trees were grown on small test sites along the Columbia River near Ro-Ge. Until 2001, some of these plots were owned by the James River Conservation Project, a non-profit project was being conducted by the Tree Biosafety and Genomics Research Cooperative, which Strauss is a leading member. But GreenWood Resources, the global giant, inherited those survival from the project that owns roughly 22,000 acres of popular plantations throughout the state and now owns these plots, was not willing to host Strauss’ transgen-ic research. (The trees were in fact grown on land that was closed to the public.) Strauss was shocked. But it was worth it, Strauss says, for the results. “I was happy with the results,” he says.
worry about biotech crops is not so much
that a nefarious corporation is trying to
push harmful products onto farmlands or
into Happy Meals, but that GMOs could
spread pesticide- and herbicide-resistant
genes to other plants, and eventually those
very pesticides or herbicides will no lon-
ger work.
In the case of the Madras grass escape,
scientists’ conclusions about how
much harm was really done have landed
far from the sensational media reports.
OSU professor of weed science Carol
Mallory-Smith, OSU crop scientist
Marvin Butler, recently retired USDA
geneticist Reed Barker, and other ex-
perts all agree that the Roundup-
resistant bentgrass blunder has had, and
will likely have, negligible eco-
logical effects.
That is not to say that they, or any-
one close to this issue, is nonchalant
about what happened, or about gene
flow in general. But these wayward
grass plants are not a threat to the
high desert environment. Pull a grass
plant, and it will die the same undramatic
dose of dog pee or organic manure—

clump out of the ground or nuke it
high desert environment. Pull a grass

plants are not a threat to the

future if we are serious about quit-
ing carbon.
But so many years spent trying to
convince people to rehink GMOs
have taken a toll on Oregon State’s tree
wizard. “Maybe I should walk away
and do something else,” Strauss says.
He continues to hope that a company
like GreenWood Resources might give
transgenic poplars a chance, but he
doesn’t see it happening for another
decade, maybe longer.
On the drive back to campus, the rain
slow to a drizzle, and Strauss confesses
that sometimes he wonders whether he
would have been happier working for a
biotech firm. But he loves teaching
and still believes in his research. As he
slows to a stop at a light, he sighs and
then leans forward to inspect the bum-
er sticker on the Honda just ahead of
him. “Les. “let’s pull that person over and give
’em a kiss.”

WHOLE WHEAT BREAD
MARKET: The hungry GM INGREDIENT: Whole
wheat SOURCE: A transgenic hybrid of two
related grasses first crossed in ancient
Mesopotamia BENEFITS: Easier to harvest
than either original strain of wheat

you will hear over and over again that
GM crops must be addressed on a case-
by-case basis, because annuals are dif-
ferent from perennials, wind-pollinated plants
differ from seed crops, and so on. The

caricature that Strauss is trying to resist

is that of the environmentally reckless
mad scientist. “Breeding of any kind isn’t
innocuous,” he says, noting that enhance-
ing the reproductive powers of an already
weedy plant, for instance, could be trou-
ble, whether done by way of conventional
breeding or gene splicing. But breeding is
something humans do, and always have
done, to domesticate and improve plants,
and we should not reflexively reject the
newest tools for doing it.
In some ways, Strauss’s world-
view and career illuminate the false
dichotomy between the green move-
ment and biotechnology. “Steve is
one of the most vocal advocates for
the sound application of science for evalu-
ating the potential of this technology,” says Barry Goldfarb, a
professor of forestry and environ-
mental resources at North Carolina
State University. Bradshaw, at the
University of Washington, is even
more emphatic: “The idea that sci-
entists like Steve are trying to un-
dermine public concerns or safety
review processes for money, to exert
domination over nature, or because
they don’t think about ecological
impact—that’s absurd. No one is
as aware as scientists are of this
impact [of transgenics] on the en-
vironment.” Strauss, his colleagues
argue, is a newer breed of scientist,

a green biotechnologist, whose re-
alism is reminiscent of those en-
vironmentalists who favor nuclear
power, or who at least accept that
it may have to be part of our energy
future if we are serious about quit-
ing carbon.

Whole Wheat Bread

Market: The Hungry GM Ingredient: Whole
Wheat Source: A Transgenic Hybrid of Two
Related Grasses First Crossbred in Ancient
Mesopotamia

Benefits: Easier to Harvest than Either Original
Strain of Wheat

Anti-GMO Greens Are, at Least Indirectly,
Gift-Wrapping a Monopoly for the Very
Monsanto Executives They Loathe.