

CLIMATE CHANGE

Why scientists want to help plants capture more carbon dioxide

Genetic tools that have helped create resilient crops could boost carbon removal, too.

By Casey Crownhart

October 19, 2022



GETTY IMAGES

your inbox every Wednesday, [sign up here.](#)

Hello hello!

Advertisement

This week in The Spark, we’re taking a look back at one of my favorite sessions from our ClimateTech conference last week, from a chapter we called “Cleaning Your Plate.”

In the session, I sat down with Pamela Ronald, a plant geneticist at the University of California, Davis. She’s been working for years on helping rice survive floods, and now she’s turning her attention to using advanced genetics for carbon removal on farmland.



CHINA REPORT

A weekly newsletter for behind-the-scenes insights on China and tech news.

Enter your email

Sign up

By signing up, you agree to our [Privacy Policy](#).

Genetics and plants

Scientists have a wide range of tools at their disposal to influence how plants grow. From standard genetic engineering to more sophisticated gene editing tools like CRISPR, we have more power than ever to influence what traits we want in crops.

But genetic tweaking isn’t anything new. “Virtually everything we eat has been improved using some sort of genetic tool,” Ronald pointed out in our interview at ClimateTech, with a few exceptions like foraged blueberries and mushrooms, and wild-caught fish.

using mutagenesis—using chemicals or radiation to cause random mutations, some of which were beneficial.

The difference is, in the last 50 years, genetic tools have become much more precise. Genetic engineering allowed the introduction of specific genes into a target plant. CRISPR has allowed scientists to have an even finer touch, influencing specific points in DNA.

“What’s really exciting now is that we have a lot more tools,” Ronald said.

Advertisement

The power of precision

To understand just how powerful genetic tools can be in agriculture, take a look at Ronald’s project developing **flood-resistant rice**.

Time-lapse video shows flood-tolerant Scuba Rice (5...



Rice plants grow well in standing water, but most varieties will die if they’re submerged for more than three days, which can happen often in low-lying farmland. An estimated four million tons of rice are lost each year to floods—enough to feed 30 million people, Ronald said.



The Gender issue

Subscribe and learn how science and technology have long pushed the boundaries of sex and gender.

[See offers](#)

Using modern genetic tools including one called marker-assisted breeding, the researchers were able to breed the gene responsible for flood-tolerance, called Sub1, into popular rice varieties. In controlled experiments, researchers compared Sub1 rice to standard varieties by growing both for a four-month period that included a two-week flood. In flooded conditions, the Sub1 gene increased rice yields by 60%.

Ronald said the project was especially successful because of who has benefitted: some of the poorest farmers in the world. For more on the flood-resistant rice work, check out this [profile of Ronald](#) my colleague James wrote in 2017.

Next up: carbon removal?

Ronald and I also discussed a new project she's been working on, which is focused on using crops for carbon removal. The research is spearheaded by the Innovative Genomics Institute, founded by Nobel Prize winner and CRISPR pioneer Jennifer Doudna.

Related Story

[This CRISPR pioneer wants to capture more carbon with crops](#)

New research at Jennifer Doudna's institute aims to create faster-growing, carbon-hungry plants using the gene-editing tool.

I [wrote about this project](#) back in June when it was announced with funding from the Chan Zuckerberg Initiative. At ClimateTech, Ronald walked me through more details on the goal of the project.

“The most effective and amazing carbon removal technology is photosynthesis,” Ronald said in our interview.

Plants naturally draw down carbon dioxide and transform it into complex compounds like sugars. Many of the sugars made in photosynthesis are eventually broken down again, returning to the atmosphere. But some carbon stays in the soil—and Ronald and her team want to help bump up how much.

There are a few prongs to this plan.

- Boost photosynthesis, so crops can grow more quickly and suck up more carbon.
- Grow plants with especially long roots, so that more carbon ends up deep underground.
- Help plants associate with specific bacteria. This one is a bit complicated, but basically some bacteria help mineralize carbon dioxide underground, trapping it.

In addition to tweaking plants, researchers will work to better understand how carbon is moving through plants and the surrounding environment to see how much they’re actually helping.

Keeping up with climate

Patrick Brown, Impossible Foods co-founder, shared on the ClimateTech stage that his company is working on **filet mignon**, and the prototypes he’s tasted are “pretty damn good.” ([MIT Technology Review](#)).

A pair of protesters threw **tomato soup** on an iconic Van Gogh Sunflowers painting at the National Gallery in London. The painting, which is behind glass, was not harmed, but many in the climate world have conflicted feelings about this protest tactic. ([Washington Post](#)).



Be at the forefront of
emerging tech

Get exclusive insights and news from
the experts.

Subscribe

Snow Crab populations are plummeting. The drop off is striking, but the situation is probably not as mysterious as some outlets are making it out to be—rising ocean temperatures due to climate change are largely to blame. ([Grid News](#))

Researchers launched what they're calling the "**Battery Data Genome**" project to gather more information about EVs. They're asking for data from national labs, universities, and companies in an attempt to better understand battery performance. ([Inside Climate News](#))

Advertisement

California approved a new **\$140 million desalination facility** in Orange County. The state has rejected some other similar projects in the past over concerns about environmental effects, even as their water crisis worsens. ([CalMatters](#))

→ For a deeper dive on the promises and challenges of desalination and how it can fit into water supplies, check out [my feature on El Paso's water system](#) from our Water issue last year.

If you missed out and want more details on what went down at ClimateTech, check out our live blogs for the highlights!

→ [Day 1](#): Energy systems, investing, hard-to-solve sectors, and food

→ [Day 2](#): Corporate sustainability, city science, transportation, and big ideas in energy

New research, detailed in [Scientific American](#), shows that a person's body smell, specifically the level of carboxylic acids on their skin, is related to how attractive they are to mosquitoes.

If you, like me, are always the one getting eaten alive at barbecues, there could be hope: this research could eventually lead to better repellants, maybe using bacteria to break down the carboxylic acids.

THE DOWNLOAD

✕

Sign up for your daily dose of what's up in emerging technology.

Enter your email

Sign up

By signing up, you agree to our [Privacy Policy](#).

Advertisement

Now I just need something to keep bonfire smoke from following me around.

That's all for this week's edition of The Spark. As always, if you have questions or want to share suggestions for what you'd like to see in upcoming issues of the newsletter, [send them my way!](#) See you next Wednesday!

Casey **T**

by Casey Crownhart

Continue reading more stories

Subscribe now for unlimited access.

Subscribe

DEEP DIVE

CLIMATE CHANGE

China's heat wave is creating havoc for electric vehicle drivers

The country is a leader in EV adoption, but extreme weather is exposing weaknesses in its charging infrastructure.

By Zeyi Yang

The US agency in charge of developing fossil fuels has a new job: cleaning them up

The Office of Fossil Energy and Carbon Management has a new name, new leaders, and a new mandate to meet Joe Biden's climate goals.

By James Temple

China is betting big on another gas engine alternative: methanol cars

Methanol fuel can help China reach its carbon-neutrality goal faster — as long as it isn't made from coal.

By Zeyi Yang

How ammonia could help clean up global shipping

The fuel could provide an efficient way to store the energy needed to power large ships on long journeys.

By Casey Crownhart

STAY CONNECTED

Illustration by Rose Wong

Get the latest updates from MIT Technology Review

Discover special offers, top stories, upcoming events, and more.

Enter your email



Our in-depth reporting reveals what's going on now to prepare you for what's coming next.

Subscribe to support our journalism.

[About us](#)

[Help & FAQ](#)

[Careers](#)

[My subscription](#)

[Custom content](#)

[Editorial guidelines](#)

[Advertise with us](#)

[Privacy policy](#)

[International Editions](#)

[Terms of Service](#)

[Republishing](#)

[Write for us](#)

[MIT News](#)

[Contact us](#)