



2021 Agricultural Outlook Forum

Building on Innovation: A Pathway to Resilience

**ADDRESSING CLIMATE CHANGE AND
SUSTAINABILITY THROUGH
AGRICULTURAL INNOVATION**

Jon Entine 19 February 2021

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Global Gene Editing Regulation Tracker

Our interactive GLP global map explains the status of each country's regulations for human and agricultural gene editing and gene drives.



Anti-GMO Advocacy Funding Tracker

This GLP project maps contributions by foundations to anti-biotech activists and compares it to pro-GMO industry spending.



GLP Features



Podcast: 'Greedy' factory farms? Milk without cows; Vaccine for melanoma

Cameron English, Kevin Folta



Reversing aging: We can turn back cognitive decline in mice. Will the same techniques work on humans?

Richard Faragher



Top 10 biotech propagandizers: Who are the science deniers and snake oil peddlers undermining science in agriculture and medicine?



Viewpoint: Promoting science with ideology — Pro-GMO vegans use animal rights advocacy to boost vaccine, biotech acceptance

Luis Ventura

Outbreak

Biomedicine, Vaccines & Policy Solutions



Yusef Paolo Rabiah

We might be able to protect ourselves against future pandemics by gene editing embryos



Andrew Sullivan

Dawn beckons as COVID vaccines roll out, but the next few months promise to be the darkest yet, and echoes of the AIDS era



Ricki Lewis

When the faster-spreading and more virulent COVID-19 mutant came to my home town, it shook up everyone. Here's an explainer of what it foreshadows

More...

— Outbreak Daily Digest —

Philadelphia Inquirer

We've made remarkable progress developing vaccines but treatments for COVID victims remain elusive

The Scientist

Mystery of how COVID-19 ravages the brain deepens

Reuters

'They will turn into alligators': Evangelical Christian missionaries turning Amazon villages against COVID vaccines

Scientific American

Viewpoint: Why we need to require COVID vaccines in high-risk settings such as nursing homes and prisons

More...

Food & Ag Daily Digest

News from Around the Web

Cuba establishes expert commission to ensure safe, sustainable use of GM crops

Walkiria Juanes Sánchez | Granma

Spray-on viral treatment can 'fine-tune' crops as they grow, without genetic engineering

by Catherine Malachuk

Human Daily Digest

News from Around the Web

Is art an evolutionary adaptation?

Sonya Sammut | Times of Malta

Viewpoint: Wishful worries? Fears about the transhumanist, human-enhancement movement are overblown

John Horgan | Scientific American

Biomedicine

- COVID/Vaccines & Denialism
- Biopharmaceuticals
- Gene Editing/CRISPR
- Epigenetics
- Gene Therapy
- Synthetic Biology
- Personal Genomics

Food & Agriculture

- Transgenics/GMOs
- Gene Editing/CRISPR
- Animal Biotechnology
- Crop Chemicals
- Pollinators (e.g. Bees)
- Gene Drives
- Sustainability & Climate Change

Human and Agriculture Gene Editing: Regulations and Index



Human / Health

- Therapeutic / Stem Cell
- Germline / Embryonic



Gene Drives



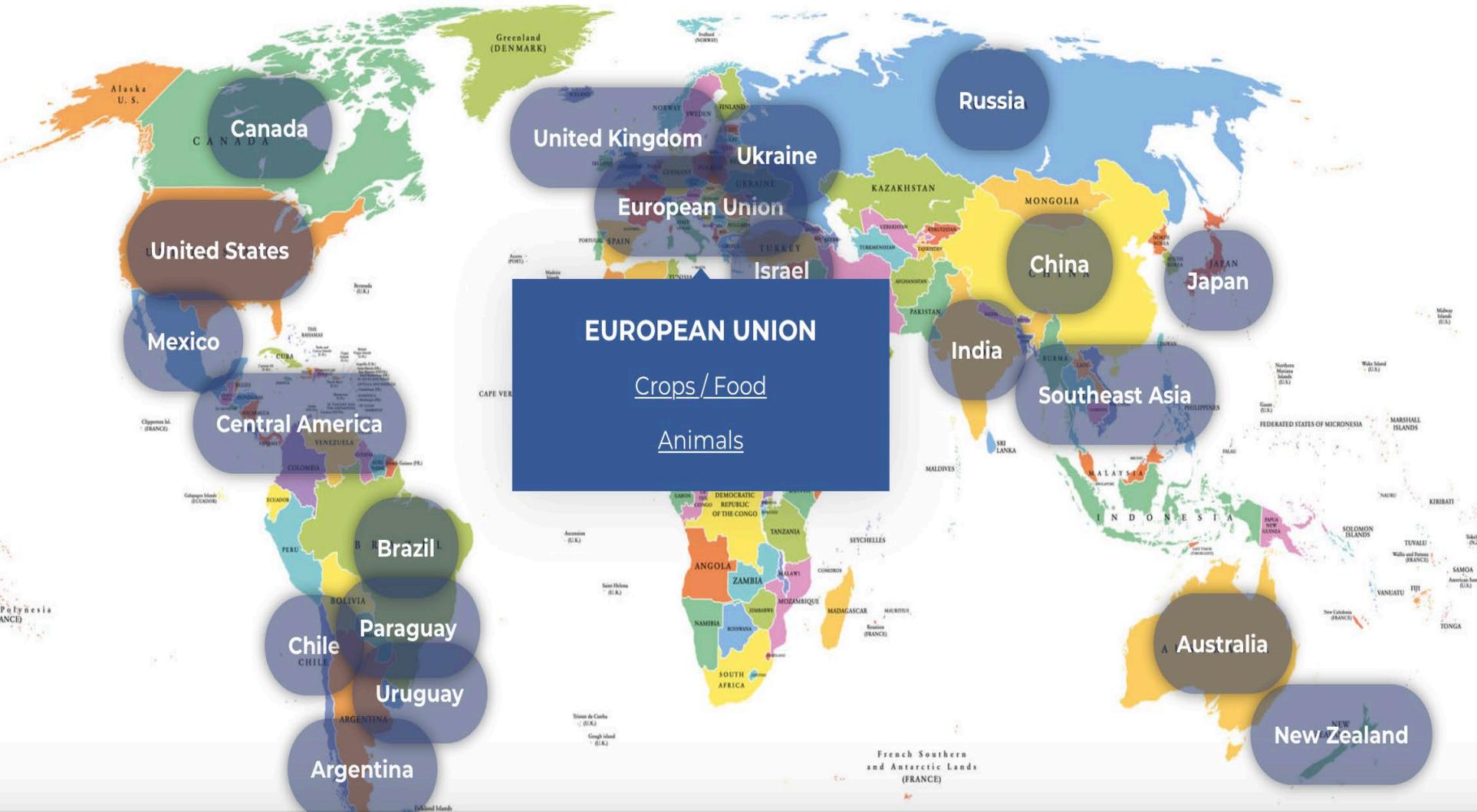
Agriculture

- Crops / Food
- Animals

[Worldwide Gene Editing Timeline](#)

[What is CRISPR and Gene Editing?](#)

Click on a country (eg. Brazil, US) or region (eg. European Union) below to find which agriculture products and processes are approved or in development and their regulatory status. The regulations on genetically engineered crops and animals are emerging out of the regulatory landscape developed for transgenic GMOs.





**HOW CAN WE
PROMOTE
SUSTAINABILITY
AND MITIGATE
CLIMATE
DISRUPTION?**

**HOW DO PEOPLE
FORM OPINIONS
ABOUT FOOD &
FARMING, AND
'DISRUPTIVE'
TECHNOLOGIES
SUCH AS GMOS
AND CRISPR?**

ACHIEVING NET ZERO

MEETING THE CLIMATE
CHANGE CHALLENGE



ORGANIC/REGENERATIVE/AGROECOLOGY VS ‘ALL TOOLS IN THE TOOLBOX’ FARMING

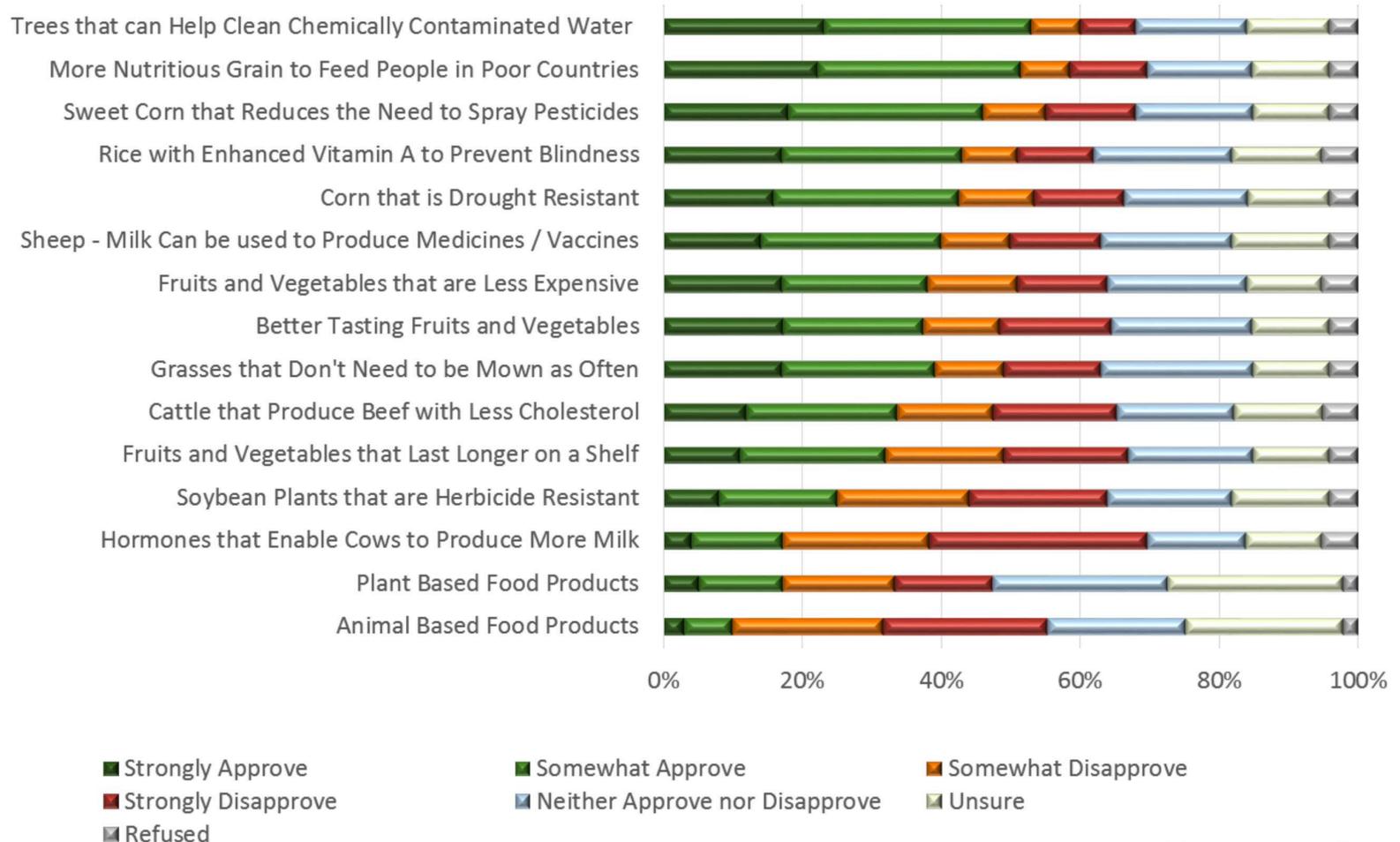
- *"Increasing the proportion of agriculture that uses sustainable, organic methods of farming is not a choice, it's a necessity. We simply can't continue to produce food far into the future without taking care of our soils, water and biodiversity.*
 - Claire Kremen, co-director of the Berkeley Food Institute
- *"Contrary to widespread consumer belief, organic farming is not the best way to farm from an environmental point of view. [T]here are now several cutting-edge agricultural practices which are good for the environment, but difficult or impossible for organic farmers to implement within the constraints of their pre-scientific rules.*
 - Steve Savage, plant pathologist

It's time to change the conversation



WHAT BIOTECHNOLOGY PRODUCTS MIGHT CONSUMERS EMBRACE? THOSE PERCEIVED TO PROMOTE SUSTAINABILITY, HEALTH AND NUTRITION

Approval of the Use of GM to Create:



European Green Deal – Farm to Fork Strategy for Sustainable Food



WE NEED SUSTAINABLE & HEALTHY FOOD
THAT WORKS FOR PEOPLE & PLANET

The greenhouse gas impacts of converting food production in England and Wales to organic methods

Laurence G. Smith, Guy J. D. Kirk , Philip J. Jones & Adrian G. Williams

A switch to entirely organic farming reduces the amount of calories that can be created on the same amount of land by 40%. ... England and Wales would need to import food from elsewhere to meet current food requirements. This would require using 5x more land overseas than currently, and increase energy usage necessary for transport, with a much bigger carbon footprint. A switch to organic farming would push greenhouse gas emissions up 20% to 58%.

HOW NOT TO ACHIEVE SUSTAINABILITY: USING ONLY ONE TOOL IN THE AGRICULTURAL TOOLBOX

European Scientist

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- Editor's choice -

Europe's Green Deal 'Farm to Fork' Plan: How Not to Grow Food Sustainably

By Jon Entine - 24.08.2020



“Netherlands (24), Belgium (28), Ireland (29), Italy (31), Portugal (36), Switzerland (41) Germany (44) and France (47)—indeed, almost every country in Europe—uses far more toxic pesticides per hectare of available cropland than the US, which ranks 59, and liberally uses genetic engineering.

nature

Europe's Green Deal offshores environmental damage to other nations

Importing millions of tonnes of crops and meat each year undercuts farming standards in the European Union and destroys tropical forests.

“In our view, the EU should embrace ‘sustainable intensification’ practices that use new technologies to boost crop yields. For example, gene-editing techniques (such as CRISPR–Cas) can enhance the edible mass, height and pest resistance of plants without using genes from another species. Unlike the United States and China, the EU is currently treating CRISPR as conventional GM technology and lags behind them in CRISPR patents for agricultural use (18 in Europe, 61 in the United States and 259 in China) as well as in investments in such research.

GM CROPS AND CLIMATE CHANGE

- “Overall, the cultivation of GM crops over the last 18 years has delivered substantial benefits for the environment. Insect-resistant crops have resulted in a 230 million kg decrease in the use of insecticides.
- Herbicide-tolerant crops have led to reductions in fuel use and CO2 emissions of 6.3 billion liters and 16.8 million metric tons respectively, by supporting no-till farming.
- Overall, GM crops have produced an environmental benefit of 37%.”

[VIB, Flanders, Belgium life sciences research institute, September 2016](#)

RETHINKING SUSTAINABILITY: USING ALL THE TOOLS IN THE AGRICULTURAL TOOLBOX

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Organic farming with gene editing: an oxymoron or a tool for sustainable agriculture?

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Rebecca Mackelprang

Friday, October 19, 2018 - 12:30am



Rebecca Mackelprang

Postdoctoral Scholar
UC Berkeley



GreenBiz Collage

RETHINKING SUSTAINABILITY: USING ALL THE TOOLS IN THE AGRICULTURAL TOOLBOX

Genetic Literacy Project SCIENCE NOT IDEOLOGY

CRISPR and climate change: Philippines sees crop gene editing as powerful ally in fight against global warming

Charissa Luci-Atienza | Manila Bulletin | February 15, 2021



”[New Breeding Techniques] create the ability to breed crops and grasses that perform better with fewer inputs reducing costs to farmers and reducing impacts on the environment, and it creates the ability to breed plants that can adapt to the challenges of climate change.”

AGRICULTURAL BIOTECHNOLOGY, SUSTAINABILITY AND CLIMATE CHANGE: NEW TOOLS IN THE TOOLBOX



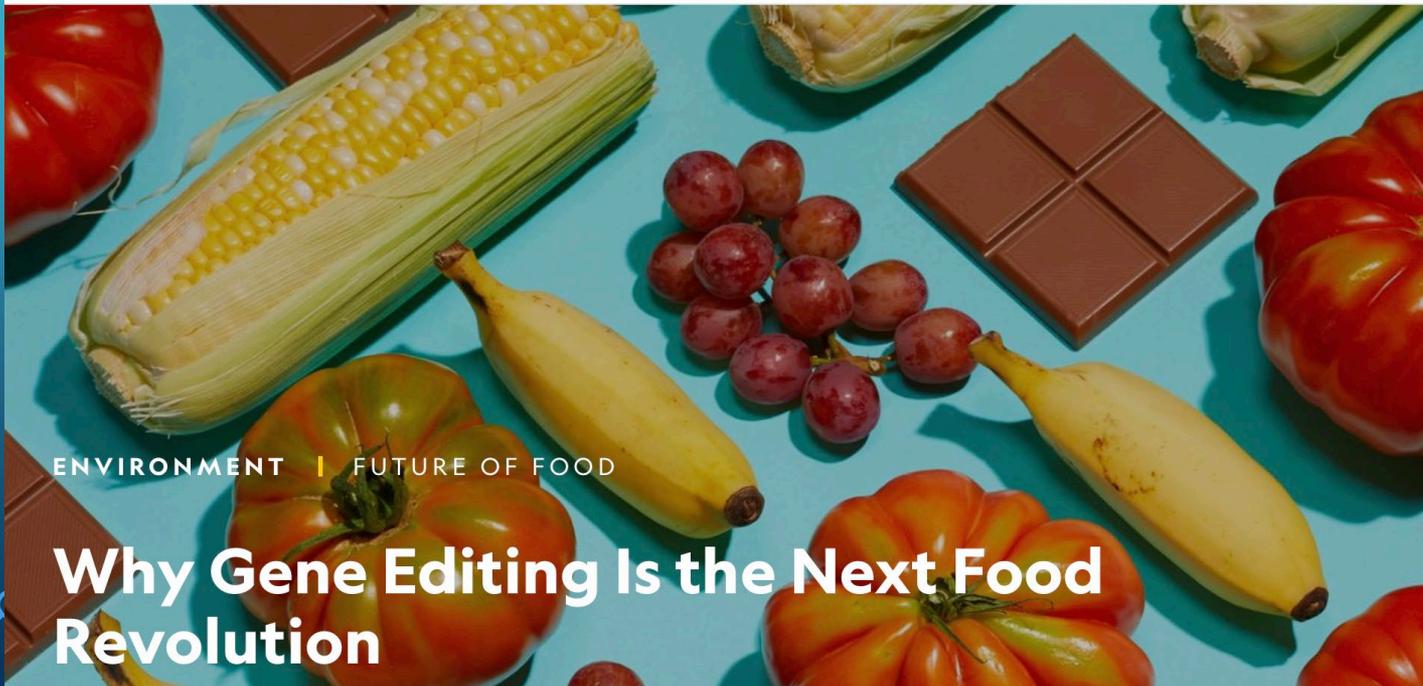
**SCIENTIFIC
AMERICAN**

BIOLOGY

New Gene-Editing Techniques Could Transform Food Crops--or Die on the Vine



**NATIONAL
GEOGRAPHIC**



ENVIRONMENT | FUTURE OF FOOD

Why Gene Editing Is the Next Food Revolution

***“IF YOU TRY TO BAN THE FUTURE, IT WILL
JUST HAPPEN SOMEPLACE ELSE”***



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