ADDRESSING CLIMATE CHANGE AND SUSTAINABILITY THROUGH AGRICULTURAL INNOVATION

Jon Entine 19 February 2021
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
Walkeria Janes Sanchez | Granma

Spray-on viral treatment can 'fine-tune' crops as they grow, without genetic engineering
Walkeria Janes Sanchez | Granma

Human Daily Digest

News from Around the Web

Is art an evolutionary adaptation?
Sonia Sammut | Times of Malta

Viewpoint: Wishful worries? Fears about the transhumanist, human-enhancement movement are overblown
John Horgan | Scientific American

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

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?

Podcast: 'Greedy' factory farms? Milk without cows; Vaccine for melanoma
Cameron English, Kevin Folta
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
"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

Climate Change being written in green text
WHAT BIOTECHNOLOGY PRODUCTS MIGHT CONSUMERS EMBRACE? THOSE PERCEIVED TO PROMOTE SUSTAINABILITY, HEALTH AND NUTRITION

Approval of the Use of GM to Create:

- Trees that can Help Clean Chemically Contaminated Water
- More Nutritious Grain to Feed People in Poor Countries
- Sweet Corn that Reduces the Need to Spray Pesticides
- Rice with Enhanced Vitamin A to Prevent Blindness
- Corn that is Drought Resistant
- Sheep - Milk Can be used to Produce Medicines / Vaccines
- Fruits and Vegetables that are Less Expensive
- Better Tasting Fruits and Vegetables
- Grasses that Don't Need to be Mown as Often
- Cattle that Produce Beef with Less Cholesterol
- Fruits and Vegetables that Last Longer on a Shelf
- Soybean Plants that are Herbicide Resistant
- Hormones that Enable Cows to Produce More Milk
- Plant Based Food Products
- Animal Based Food Products

0%  20%  40%  60%  80%  100%

- Strongly Approve
- Somewhat Approve
- Neither Approve nor Disapprove
- Somewhat Disapprove
- Strongly Disapprove
- Refused
- Unsure

Hallman, Rutgers
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

“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.
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

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

Rebecca Mackelprang
Friday, October 19, 2018 - 12:30am

Rebecca Mackelprang
Postdoctoral Scholar
UC Berkeley
"[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
New Gene-Editing Techniques Could Transform Food Crops—or Die on the Vine

Why Gene Editing Is the Next Food Revolution
“IF YOU TRY TO BAN THE FUTURE, IT WILL JUST HAPPEN SOMEPLACE ELSE”

2021 Agricultural Outlook Forum

Building on Innovation: A Pathway to Resilience

Jon Entine  18 February 2021