What Future for Plant Science in the EU?

How the EU slowed global GM crop innovation. Same happening with genome editing?

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Crop Innovation & Business, April 2019, Amsterdam

EuropaBio

Three sectors

Green: Agriculture (seeds)
Red: Healthcare
White: Industrial processes

Wide Network

55 corporate members (Healthcare + Industrial + Ag)
15 associate members and Bioregions
17 national biotech associations = +1800 biotech SMEs

BASF We create chemistry
Bayer CropScience
CORTEVA agriscience
iden biotechnology
KeyGene
KWS
Limagrain
syngenta

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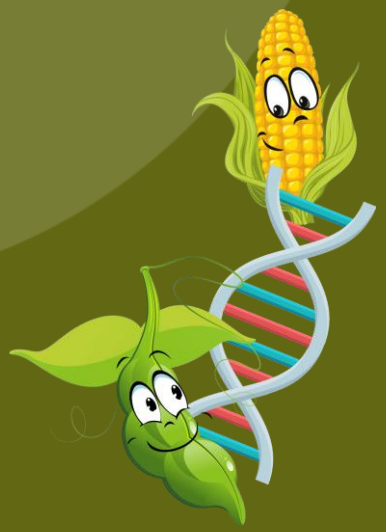
1. GM Crops - Global vs Europe



GM crop cultivation

Global GM cultivation:

~ 190 m ha
~ 12 % of global arable land
~ 5 x Germany

EU GM Cultivation:
~ 0.1 million ha

18 MILLION FARMERS PLANT GMOS WORLD WIDE

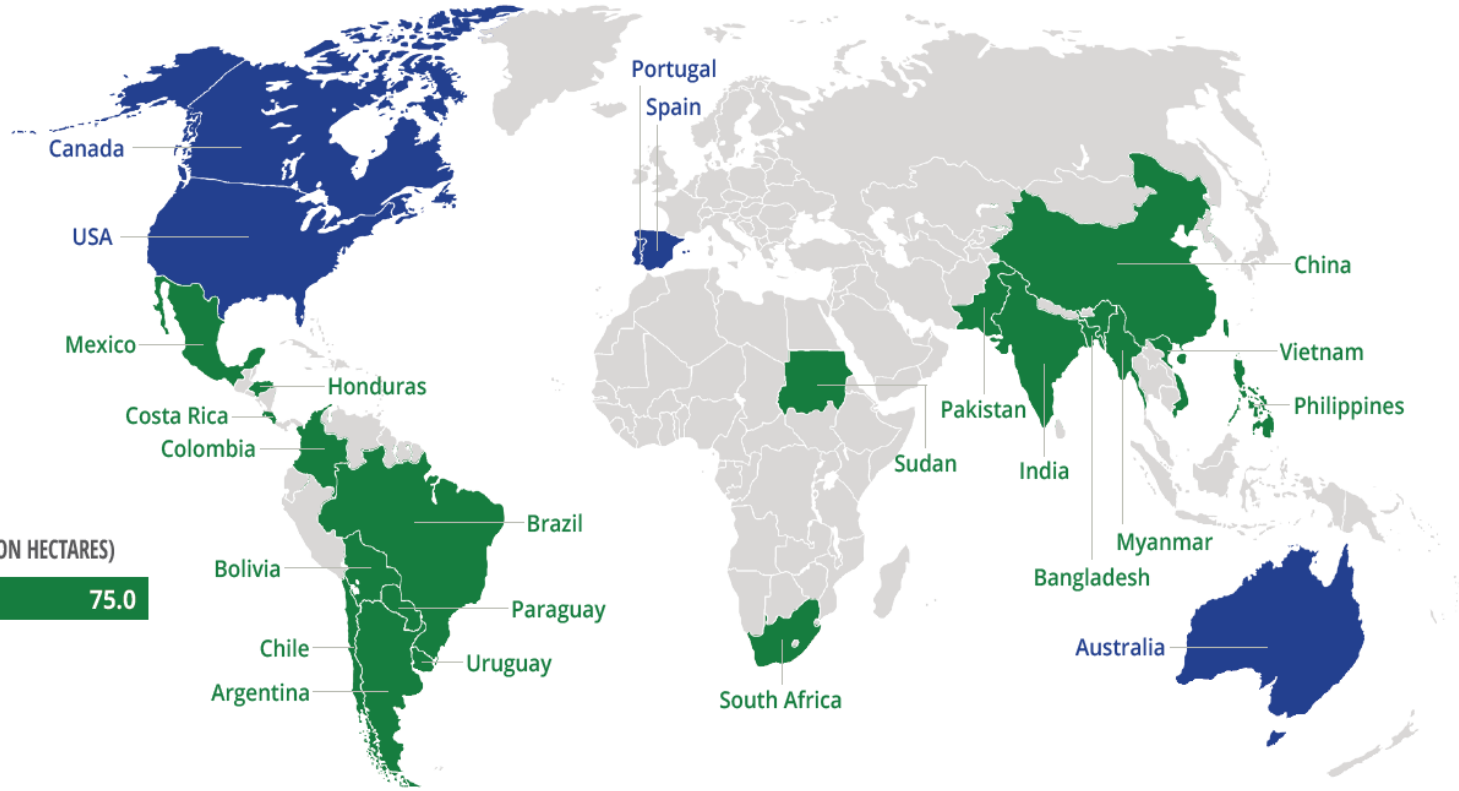
That is about **6 million** more than all EU farmers put together!

GM crop cultivation

24 countries planted 189.8 million hectares (469 million acres) of biotech crops in 2017, the 22nd year of global commercialization of biotech crops

19
DEVELOPING COUNTRIES

5
INDUSTRIAL COUNTRIES



TOP 5 COUNTRIES GROWING BIOTECH CROPS IN 2017 (MILLION HECTARES)

USA	75.0
Brazil	50.2
Argentina	23.6
Canada	13.1
India	11.4

Source: ISAAA (2018)

Importing instead

The EU depends on GM crop imports

- Livestock farming depends on soy
- EU imports 95 % of soy that it uses
- Probably over 90 % = GM soy
- Annual import = weight of all EU citizens

Price comparison for GM and non-GM soya feed in the UK as of October 2015[18]

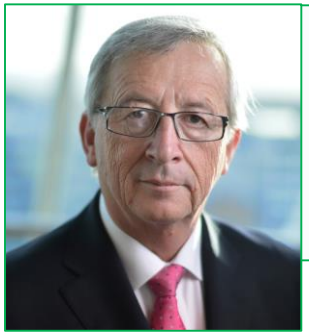
"Banning GM imports means doing away with our capability of producing food because there is very little non-GM soya on the world market and the little there is, is way more expensive."

Commissioner for Food Safety Andriukaitis, 2015

2. Expelling Innovation from Europe

Europe has excellence

- Excellent fundamental research
- Highly educated work force
- Good infrastructure
- Solid intellectual property protection
- Leading plant breeding sector with many SMEs
- Fairly vibrant healthcare and industrial biotech
- Political declarations in favour of innovation



"My first priority will be to strengthen Europe's competitiveness and to stimulate investment for the purpose of job creation."

Commission President Juncker, 2014

"The future challenges facing agriculture will require us to continue to innovate."

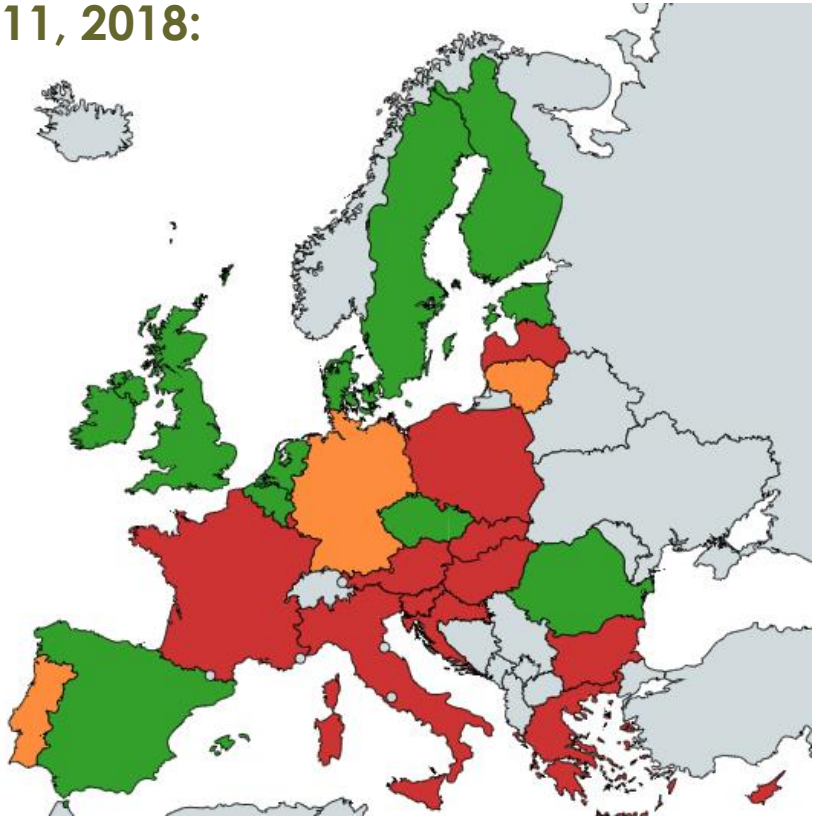
Commissioner for Agriculture Hogan, 2016

Politics trumps science

GM maize event - September 11, 2018:

28	member states	
	Minimum "Yes" required for adoption: (55%) 16	
11	14	3
Yes	No	Abstain

%	Population	
	Minimum "Yes" required for adoption: 65%	
38.75	42.59	18.67
Yes	No	Abstain



- **Never a Qualified Majority** vote for authorisation or rejection
- No relation between import volume & voting behaviour of a country

Expelling Innovation

Delays for import authorization
- Delayed access to innovation for farmers on other continents

Blocked applications for cultivation
- Just 1 crop available (1998)
- Most applications withdrawn

Sharp decline in field trials
- Drop by over 90% in 6 years

Commercial pipelines focused on other continents
- Investments and jobs relocated

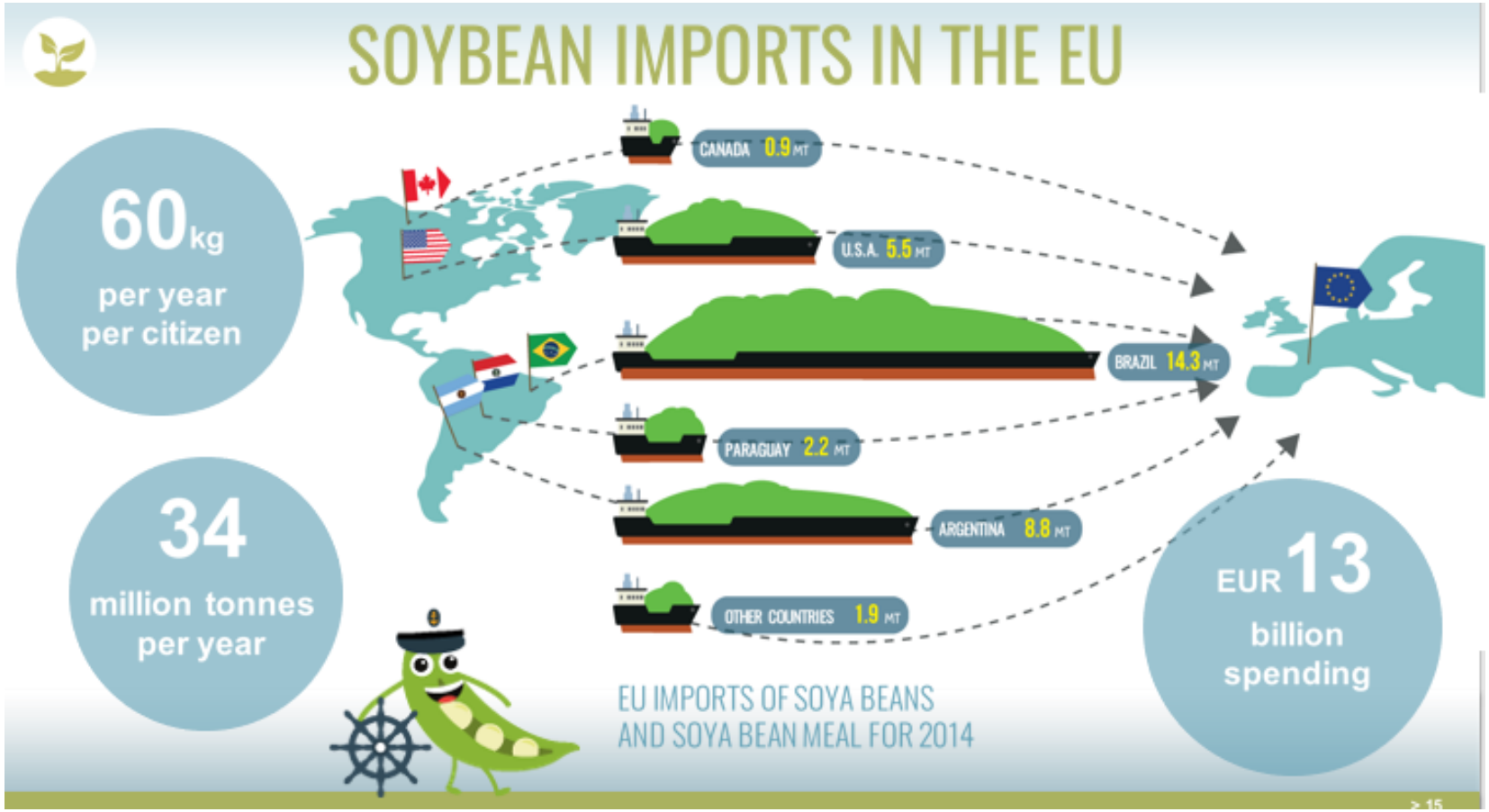
Anti GM Activists invading EFSA with smoke bombs
Italy, March 2014

Explosive package sent to EFSA in Parma
Italy, June 2016

Activist attack on plant science conference
Switzerland, August 2016

3. Delaying Innovation Globally

Trade


SOYBEAN IMPORTS IN THE EU
60kg
per year
per citizen
34
million tonnes
per year
CANADA 0.9 MT
U.S.A. 5.5 MT
BRAZIL 14.3 MT
PARAGUAY 2.2 MT
ARGENTINA 8.8 MT
OTHER COUNTRIES 1.9 MT
EUR 13
billion
spending
EU IMPORTS OF SOYA BEANS
AND SOYA BEAN MEAL FOR 2014

Just as safe in the EU

After more than 20 years of commercial use:

- **Zero cases of ill effect** of GM crop commercialisation
- More than 280 scientific institutions confirmed GM safety
- **Yet EU safety assessment timelines keep increasing**

Real EU food risks (2016)

Campylobacteriosis	Salmonellosis	Listeriosis
212 134 reported cases	94 530 reported cases	2 536 reported cases

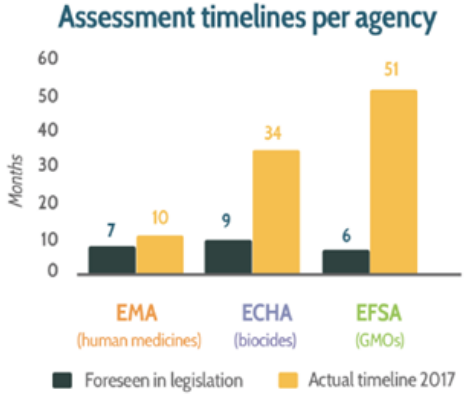
Slow EU GM import approvals

Over the last decade:

- Timelines more than doubled.
  - Now **6 years on average**.
- Cost for 1 import approval up ca. 50%.
  - Now **11-17m EUR**.

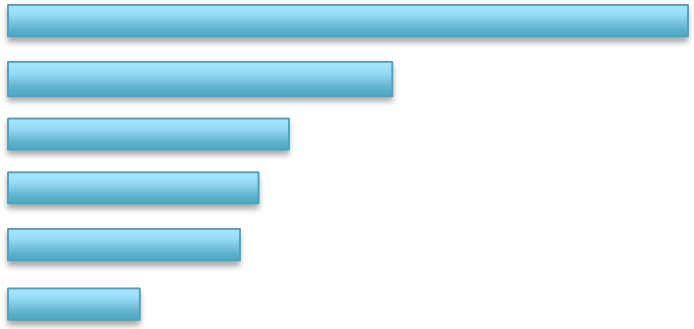
Compared to non-GM:

- GM crops regularly found to be <u>as safe as conventional</u>
- Risk assessment for GM crops in EU slower than for other products

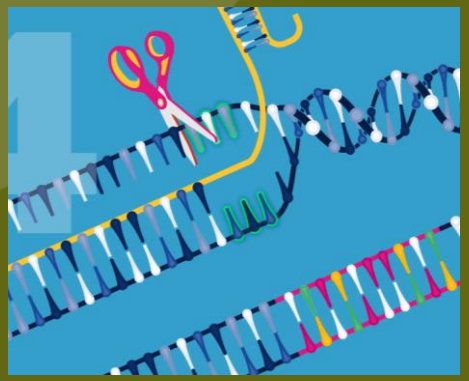


Compared to GM adopters:

- EU – 6 years
- Argentina – 3.5 y (increasing)
- USA – 2.5 y (decreasing)
- Brazil – 2 y (decreasing)
- Canada – under 2 (decreasing)
- Australia – under 1 (decreasing)



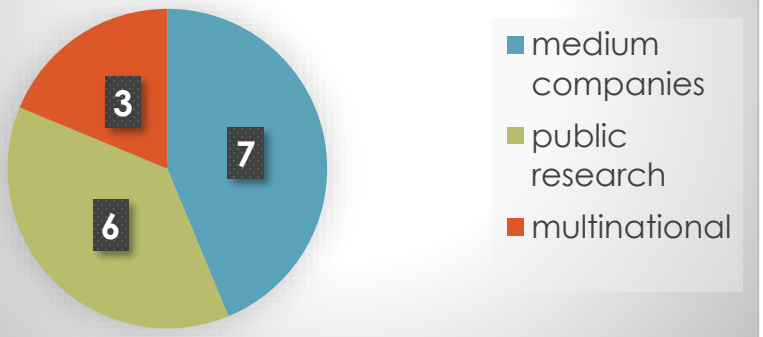
4. What about Genome Editing?



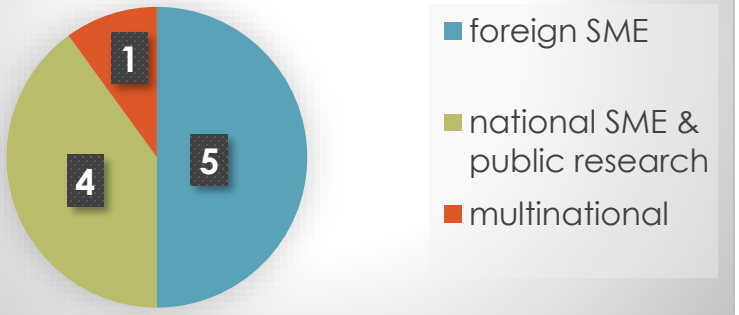
Genome editing is different

- Resulting plants usually not transgenic
- Genome-edited crops often indistinguishable
- More players (smaller companies & public)
- More crops (incl. fruit & veg), more traits

USA: confirmed non-GM NBT plants by type of developer



Argentina: confirmed non-GM NBT products by type of developer

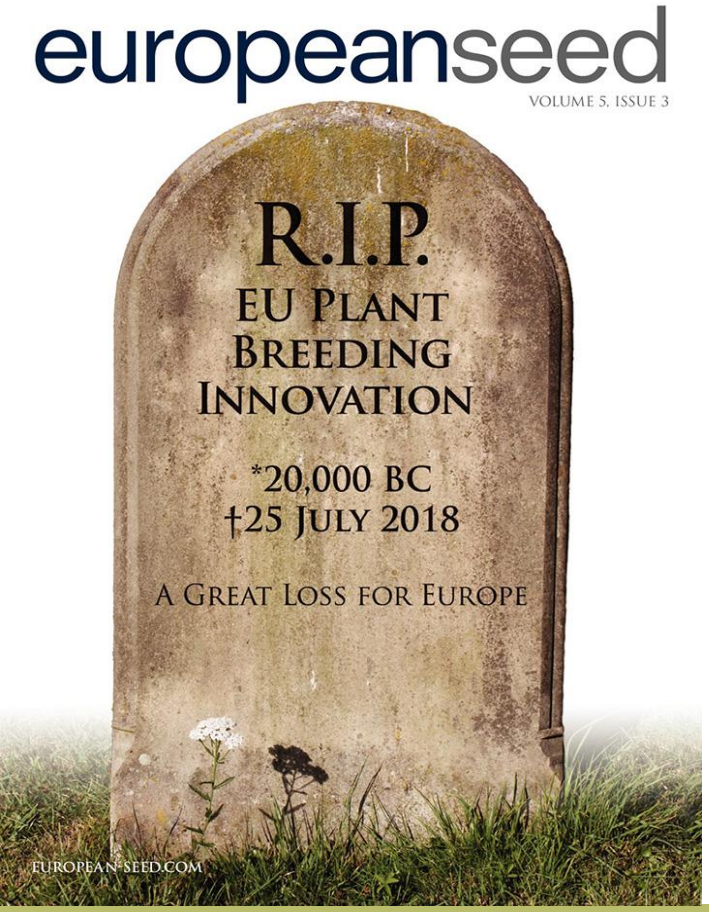


2015 Landscape

Argentina: First country with specific guidance on gene edited products

Positive Decision
No formal decision
Restrictive Decision

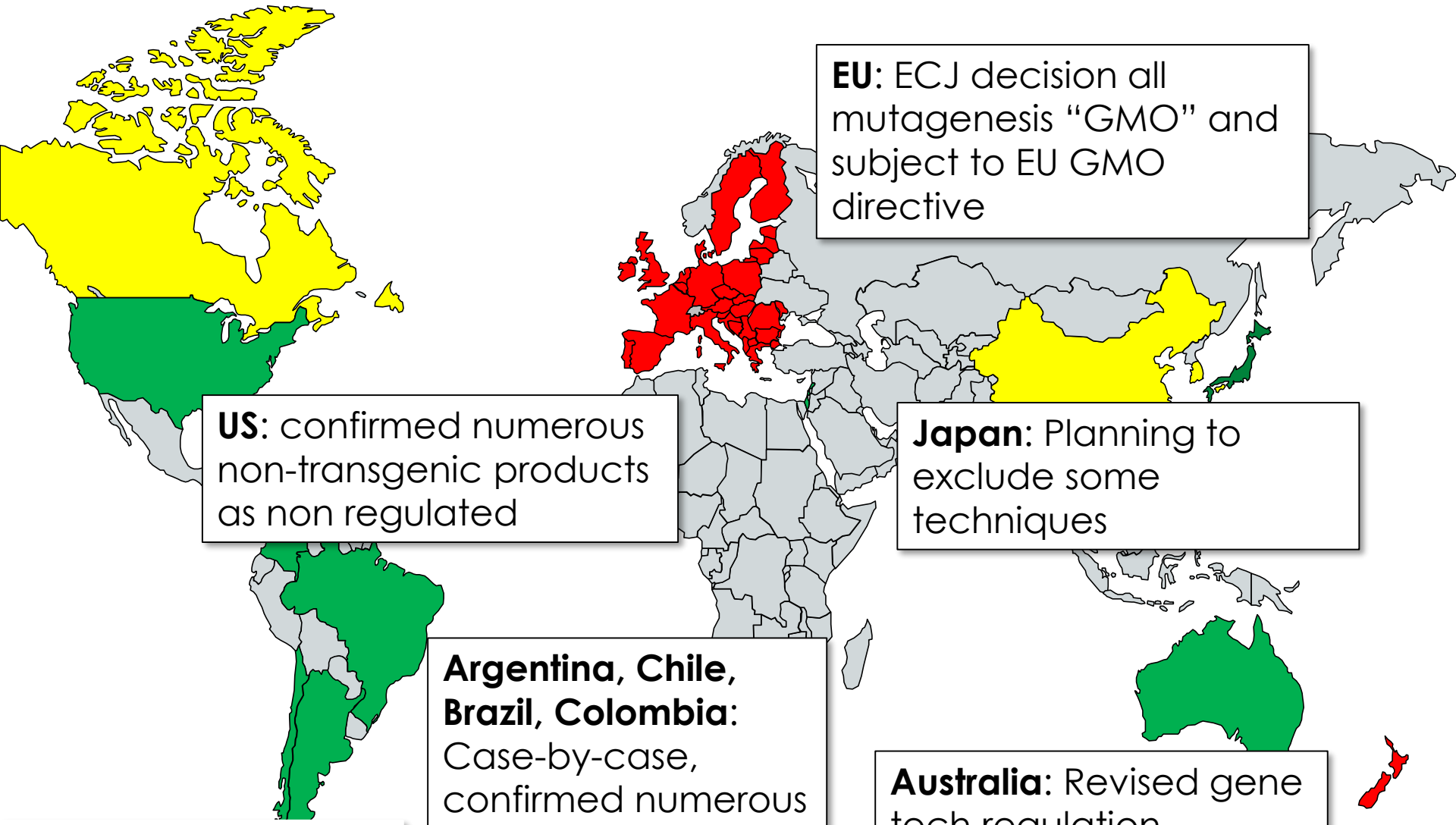
Blocking latest innovation



EU Court ruling 25 July 2018:

- Organisms obtained by means of mutagenesis (old and new) must be considered to be GMOs
- 'New' (targeted) mutagenesis crops (incl. CRISPR): require full GMO authorisation & labelling
- 'Old' mutagenesis plants: Member States may lay down rules similar to obligations GMO directive.

2019 Landscape



EU: ECJ decision all mutagenesis "GMO" and subject to EU GMO directive

US: confirmed numerous non-transgenic products as non regulated

Japan: Planning to exclude some techniques

Argentina, Chile, Brazil, Colombia: Case-by-case, confirmed numerous non-transgenic products as non-regulated

Australia: Revised gene tech regulation excludes some gene editing applications

Positive Decision
No formal decision
Restrictive Decision

5. Conclusions

- EU's handling of GMO authorization system grants no access for EU farmers and delays farmers' access elsewhere.
- Most exporting countries treat non-transgenic gene-edited crops as conventional
- EU = significant outlier on regulatory approach
- Divergent NBT regulation between countries will mean bigger trade problems than for GMOs.
- Need for international alignment
- Need for science-based regulation

More Information

154 Events in **19** Countries