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Urgency to Overhaul EU's GMO Regulation in the Context of Climate Change, Sustainable Agriculture, and Economic Pressure

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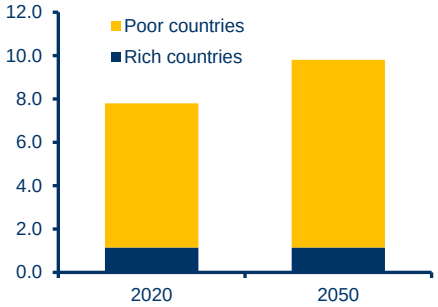
Global challenges for food & agriculture

Malnutrition: 25% lack calories and/or nutrients

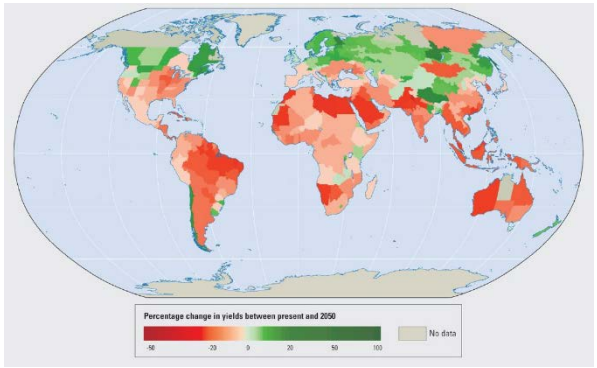
Demand growth: planetary boundaries



Environmental footprint

Climate footprint

Poverty and vulnerability: many of the poor depend on farming for their livelihoods



Negative effects on crop yields and stability

Global environmental change

Major food system transformations required

- Better social safety nets
- Dietary change
- Reduction of food waste
- Reduction in food losses
- Food production growth
- Higher crop diversity
- Resilience against shocks
- Reduction of environmental/climate footprint
- Reduction of poverty

Plant breeding technologies can contribute to many of these objectives

Common approaches in plant breeding

- Mass selection (12,000 years)
- Crossbreeding (150 years)
- Hybridization (100 years)
- Mutagenesis (60 years)
- Marker-assist… (40 years)

“Conv… eding”

… and “safe”)

EU regulatory approach

- Ge… …s)
- …ne editing (8 years)

“Genetic engineering (GMOs)”

(“unnatural” and “risky”)

Over 30 years of risk research: GMO crops are as safe as conventional ones

Social concerns related to high-tech farming

- Increasing use of chemicals
- Less diversity / monocultures
- Increasing farm sizes
- Patents on life; market monopolies
- “Industrializing” food systems

Potentials of gene editing

Resistance against pests/diseases, higher N- and P-efficiency

Successful work in >40 species

Can foster small-scale farming

Gene editing is relatively cheap; can also be used by small labs…

…if efficiently regulated and managed

But is it not too simplistic to assume that all new technologies will further aggravate these issues?

Not breeding method, but crop traits and how they are used determine effects

Meta-analysis of effects of GMOs (data from 25 countries)

	Insect resistance	Herbicide tolerance
Yield	+25%	+9%
Farmer profit	+69%	+64%
Chemical pesticides	-42%	+2%

Source: Qaim (2020)

Successfully used by smallholders

Partly monocultures on large farms

We need serious debates about what type of agriculture we want and need, but blocking useful technologies is counterproductive.

Major issues with EU GMO regulations

- Singling out transgenic & gene-edited crops as inherently more risky than conventional crops **ignores state of research**…
- …and further **fuels public fears** and misunderstandings.

- Ban on new genetic technologies for **sustainable farming**,
- **obstructs research** of EU crop scientists and breeders (field trials also effectively banned),
- **jeopardizes international competitiveness** in agriculture, crop research, seed industry, and bioeconomy
- acts as **disincentive for EU young researchers** to pursue career in one of the 21st century's key technologies.

International implications of EU approach

- In other regions, gene-edited crops **not considered GMOs**
- EU regulations **hamper international trade** and germplasm exchange (need approval for import under EU GMO law)
- Further complication: gene editing **cannot be detected** in plant/ seed (unless foreign DNA introduced)
- High regulatory cost and uncertainty:
  - impede use of gene-editing technology **also in other world regions** trading with the EU
  - contribute to further **market concentration**
- EU approach may especially **hurt poor countries in Africa and Asia**, which urgently need new agricultural technologies for sustainable food security and poverty reduction

Further reading: Qaim, M. (2020). Role of new plant breeding technologies for food security and sustainable agricultural development. *Applied Economic Perspectives and Policy* 42: 129-150. https://doi.org/10.1002/aepp.13044