



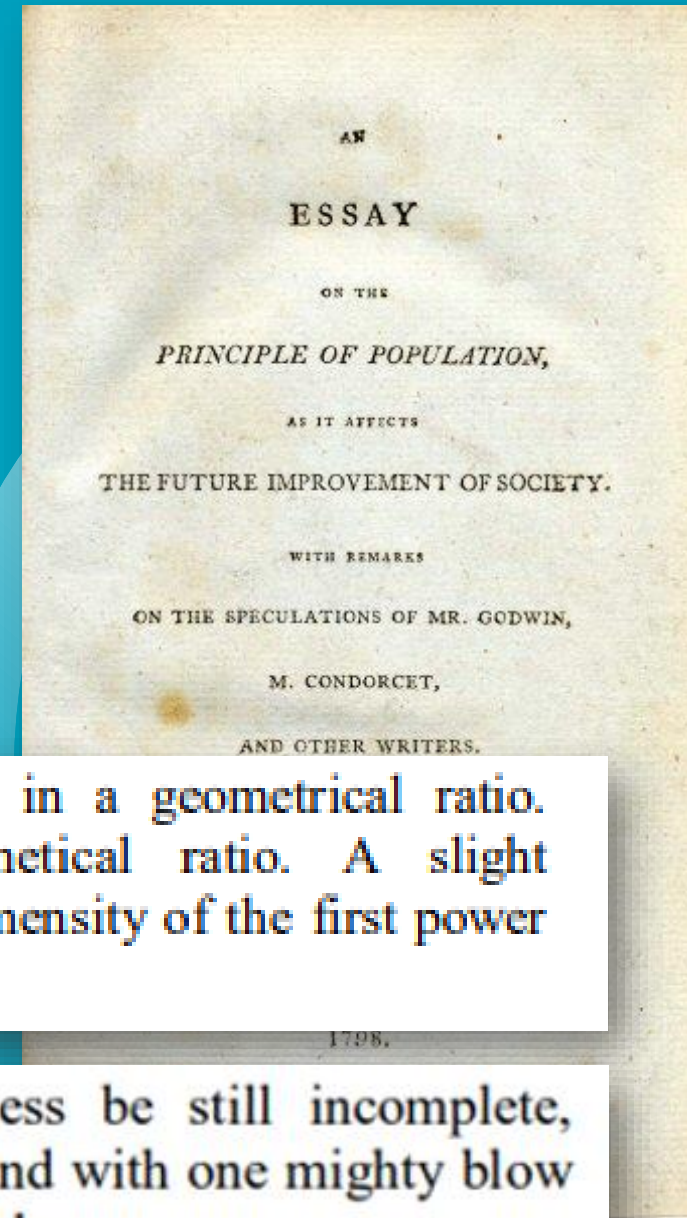
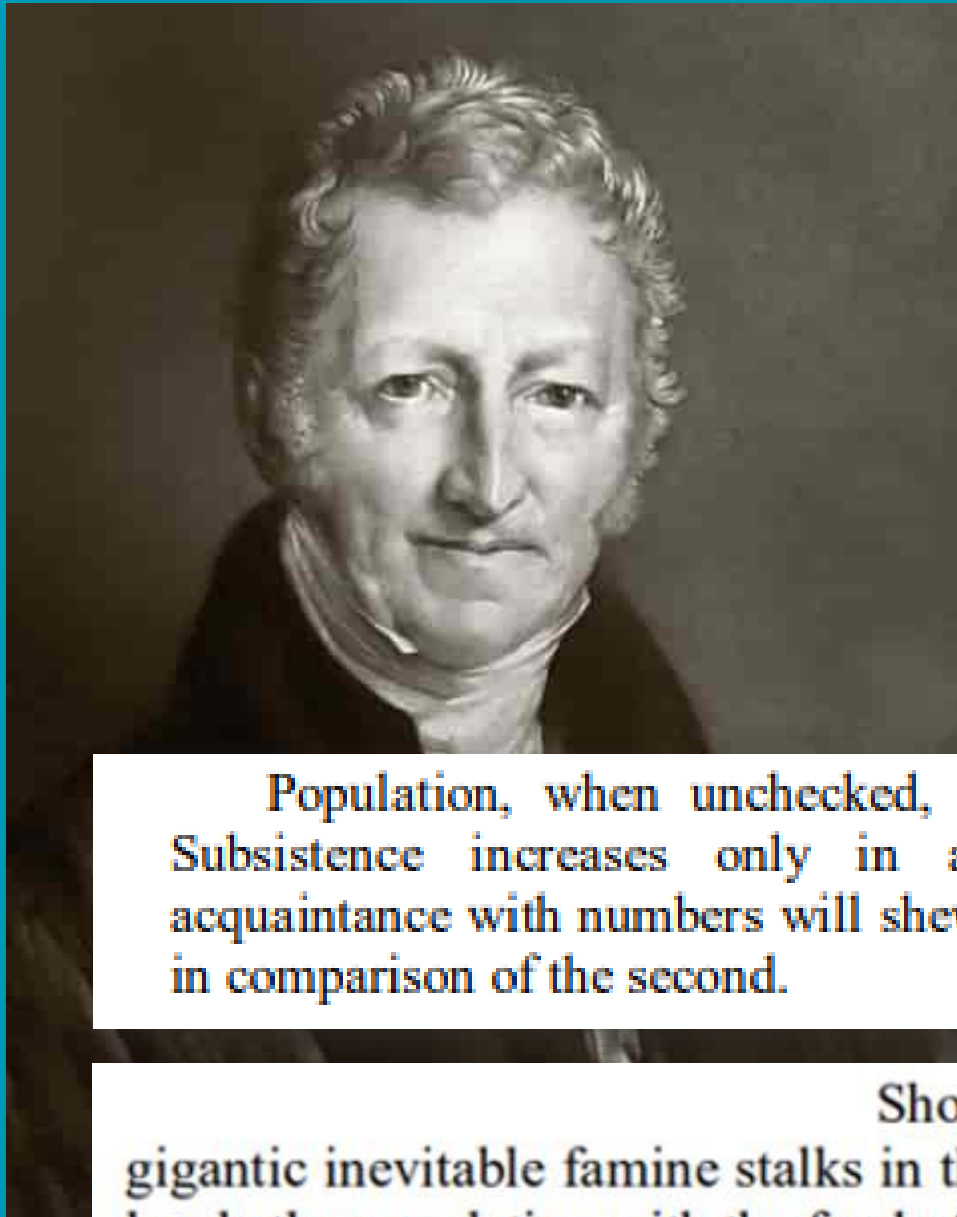
The Power of Innovation in Food and Farming

*What is the future for disease
control technologies?*

Dr. David Hughes

Head of New Technology Evaluation
for Crop Protection

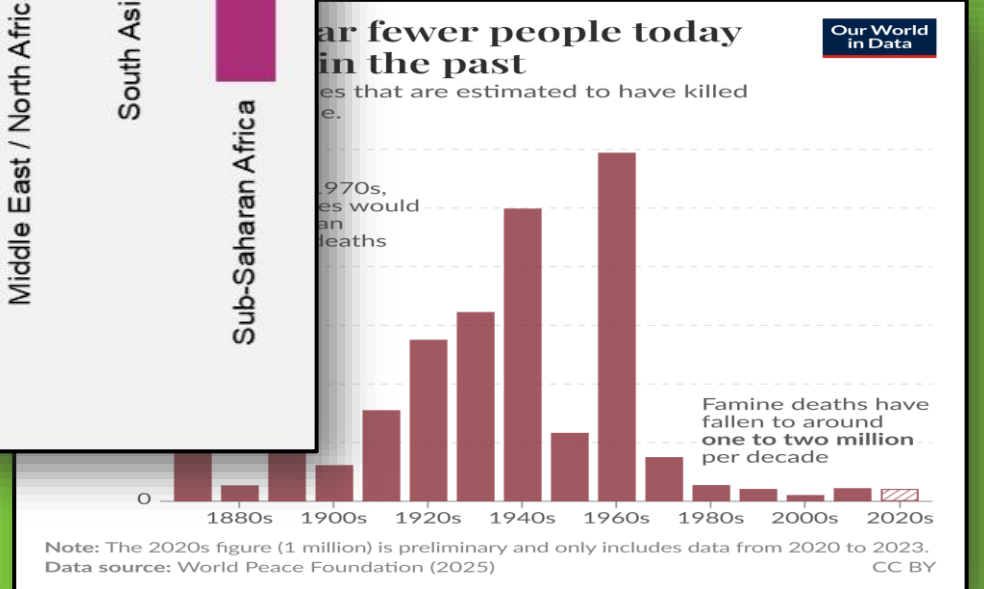
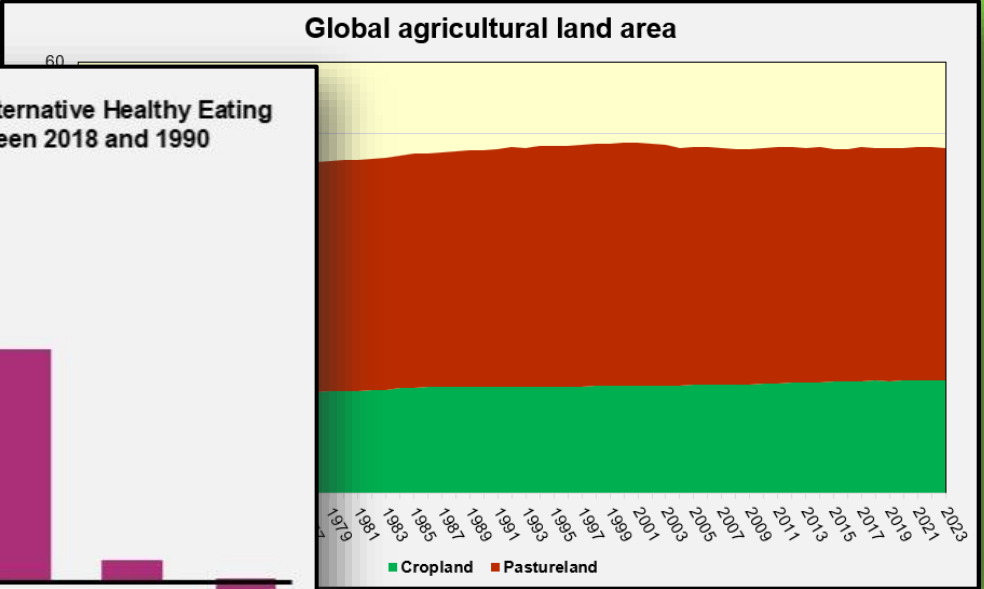
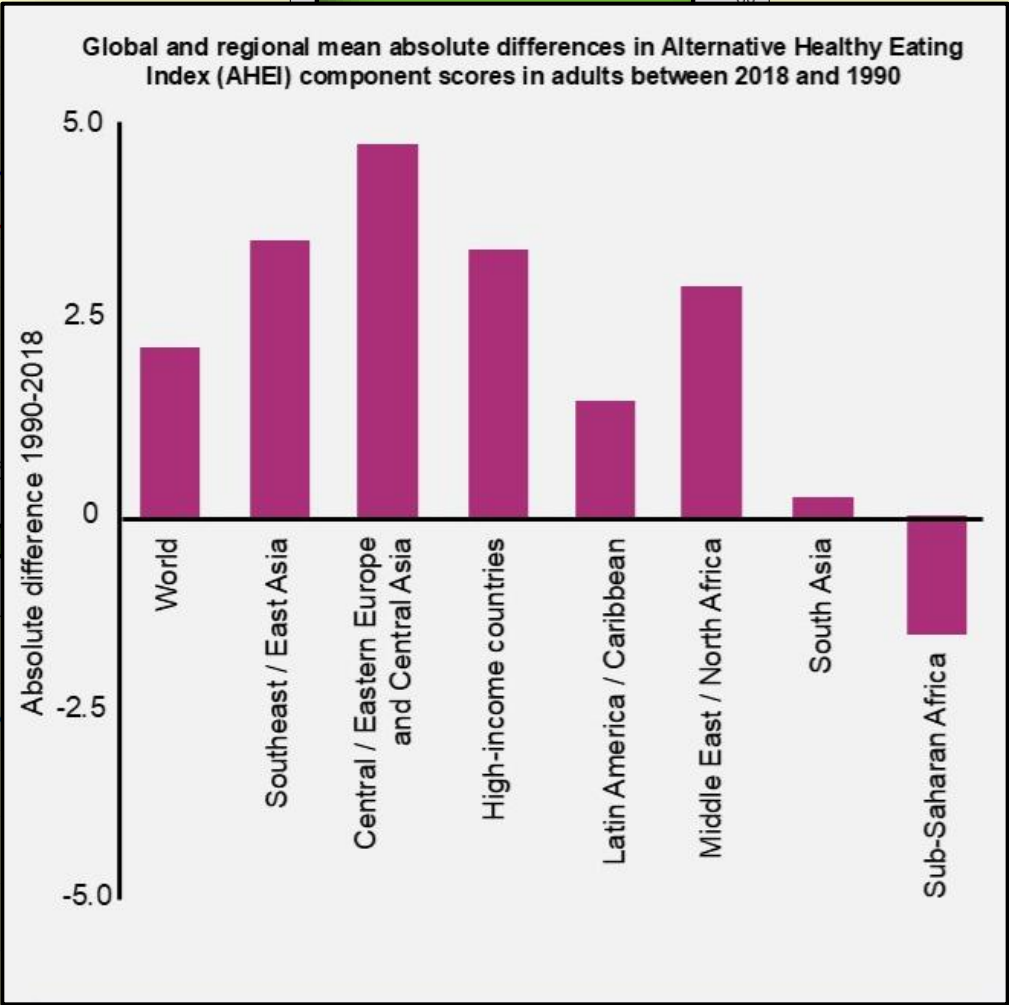
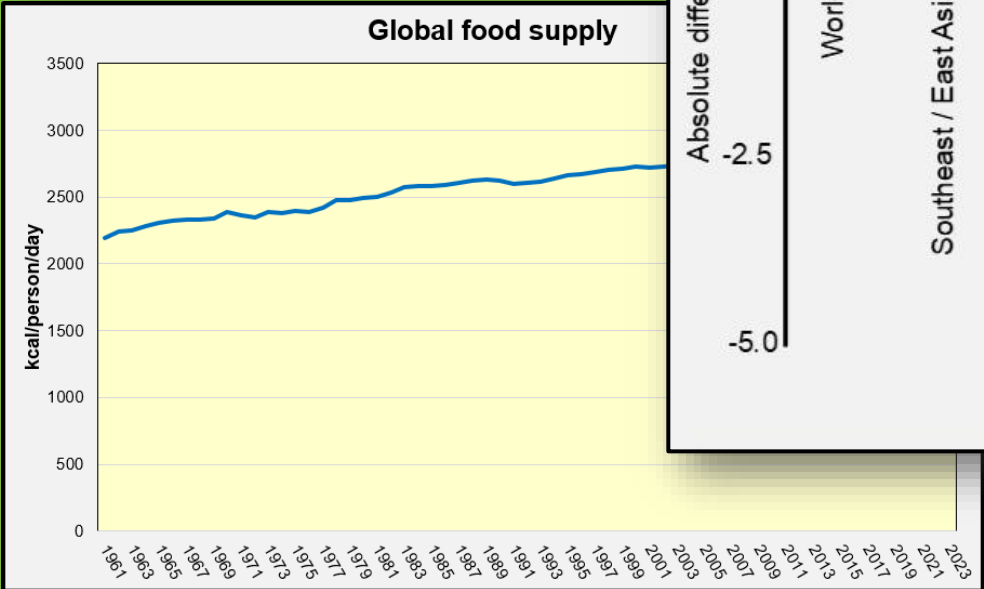
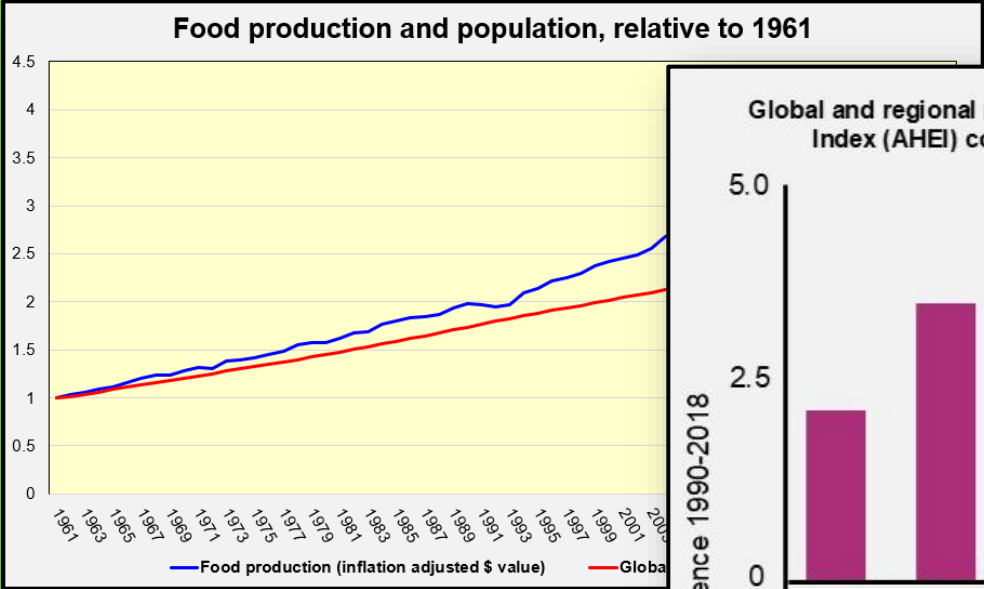




Population, when unchecked, increases in a geometrical ratio. Subsistence increases only in an arithmetical ratio. A slight acquaintance with numbers will shew the immensity of the first power in comparison of the second.

Should success be still incomplete, gigantic inevitable famine stalks in the rear, and with one mighty blow levels the population with the food of the world.

Things aren't all bad in the food system...



However, some significant challenges remain...

1. Environmental challenges

- The collateral damage done to our environment as a consequence of our food production systems
 - Pollution, GHG emissions, biodiversity collapse, soil fertility

2. Demographic challenges

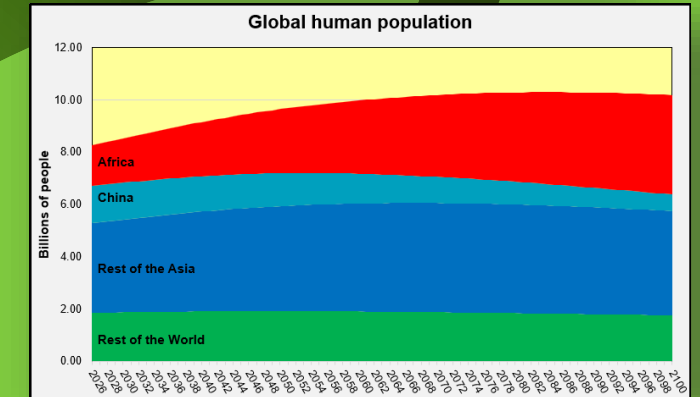
- Driving demand for increased productivity
 - How many people? Where are they? What do they want to eat? How can they access their food?

3. Geopolitical challenges

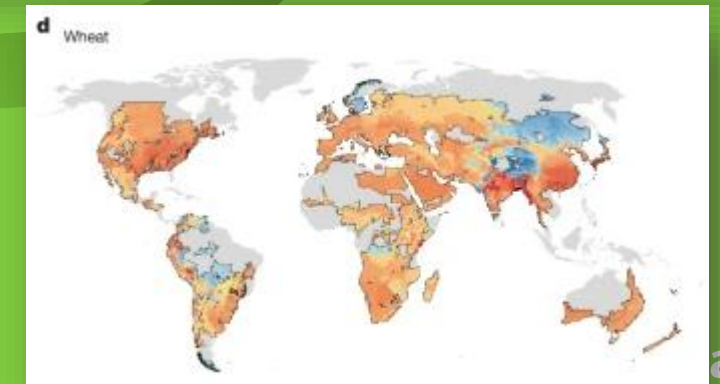
- Capricious human decisions that threaten food supply
 - Conflict, disrupted supply chains, overly precautionary regulations, reductions in funding, trade policy

4. Climate change

- Uncontrolled and accelerating disruption of the food system
 - Sea-level rise, extreme weather, shifting crop zones



Food shock is inevitable due to the Iran war – and it could get bad



Global food systems 'broken', says UN chief, urging transformation in how we produce, consume food

UN News, July 2023



Global food system needs total transformation, says Monbiot

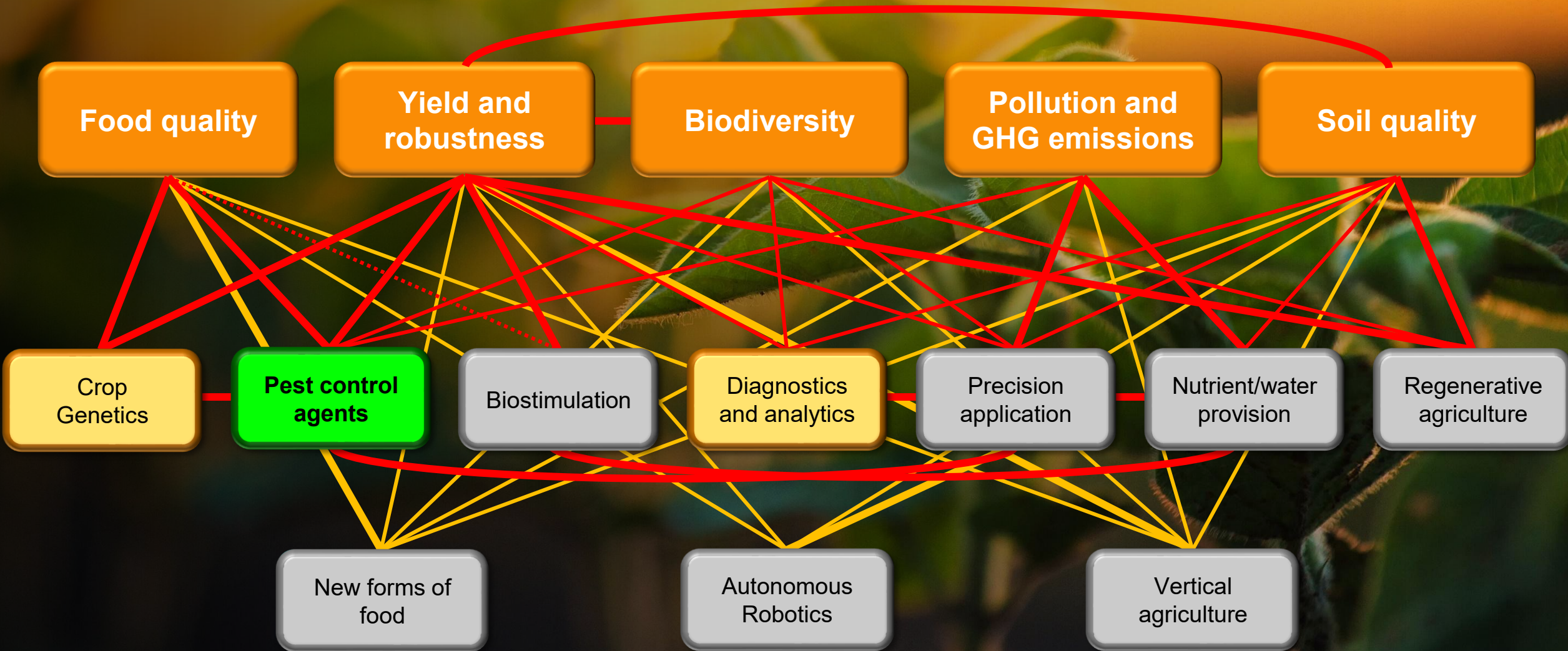
Farmers Weekly, May 2022



What are the properties of an ideal food system?

- **The system must produce sufficient food for 10 billion people**
- **The food produced must be accessible to everyone**
 - Cost, distribution and supply chain
- **The food must be high quality**
 - Safe, nutritious, healthy, delicious, convenient, varied, choice
- **Production efficiency must be maximized, and input supply must be sustainable**
 - Minimized use of inputs from renewable sources, circular economy, energy, labour, waste
 - Minimize the land footprint of agriculture to create room for other ecosystem services
 - Adequate production of non-food commodities
 - Plastics, medicines, fibres, liquid fuels, solvents, consumer goods
- **The damaging impacts of farming must be minimized**
 - Pollution, GHG emissions, biodiversity collapse, soil quality, operator safety
- **The system must be robust and resilient to disruption**
 - Foreseeable disruptions (e.g. climate change) and Black Swan events
- **The system must be economically sustainable**
 - All members of the food system can make a fair living
- **The system must be – and be seen to be – socially responsible and acceptable**

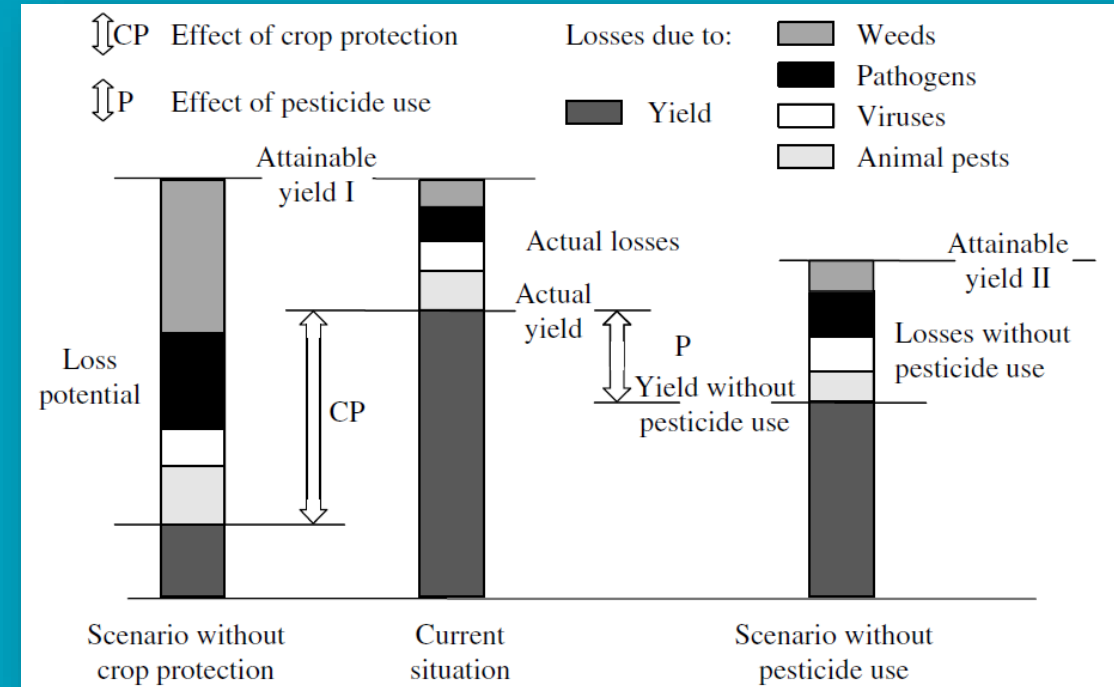
Disruptive technology opportunities to improve our crop systems



Pest control

- **Pest control is not optional for commercial farming**
- **Synthetic chemical approaches**
 - Dominant technology
 - Deeply negative public perceptions
 - Driving policy, particularly in the EU
- **Genetic approaches to pest control**
 - Traditional breeding, GM, GE
- **Agronomic approaches**
 - Crop rotation, physical barriers, natural predators
- **New agent-based approaches to pest control**

Source: E.-C. Oerke, *Journal of Agricultural Science* (2006), **144**, 31–43



Greenpeace launches petition to ban pesticides in food

22nd April 2026

EU bans caffeine use in pesticides - because it's 'harmful to humans if swallowed'

Angus Thompson

Friday 21 February 2025 11:58 GMT

Emerging agents for disease control

- **Physical agents**
 - UV-C
- **Living microbial agents**
 - The poodle/hyena problem
 - Genetically optimization?
- **Natural and semi-natural substances**
 - RNA interference
 - Proteins and peptides
 - Complex secondary metabolites

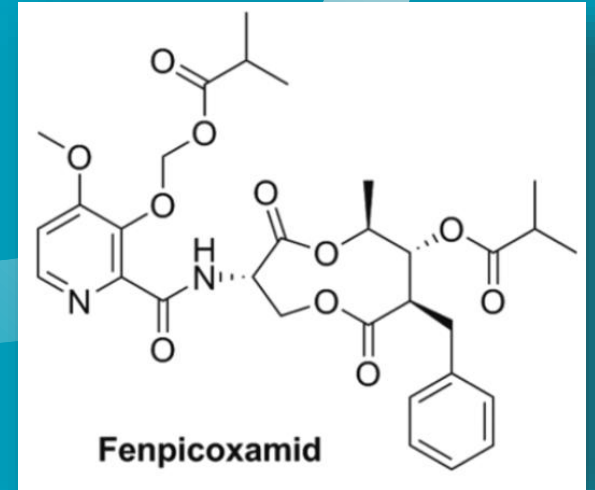
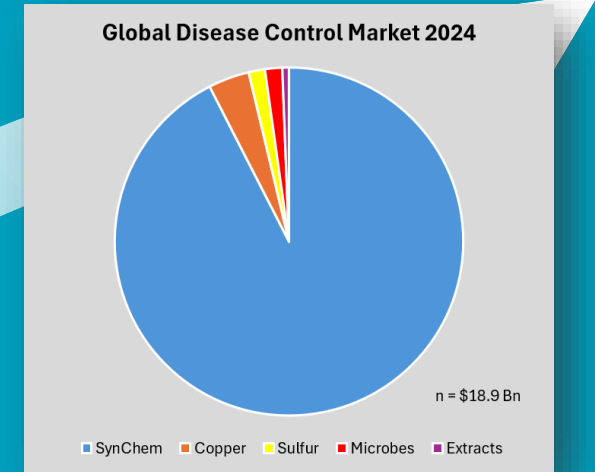


Mexico authorizes GreenLight's RNA-based biofungicide OIFIRAX

EVOCA is now EPA approved!

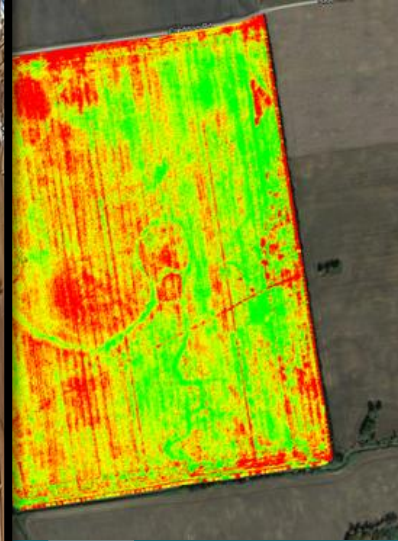
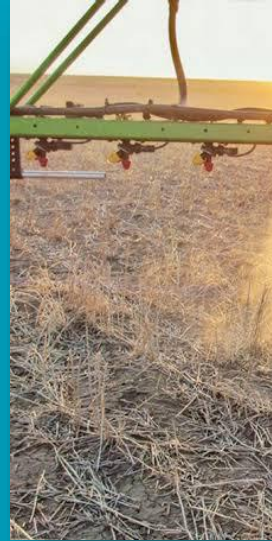
We are excited to have received regulatory approval from the U.S. EPA for our first biofungicide, EVOCA™. This product was developed using Biotals' AGROBODY™ technology platform and is the first protein-based fungicide of its kind to be approved by the EPA.

Micropep Files First Regulatory Submissions for Promisin™, a Novel Peptide Biofungicide with a New Mode of Action



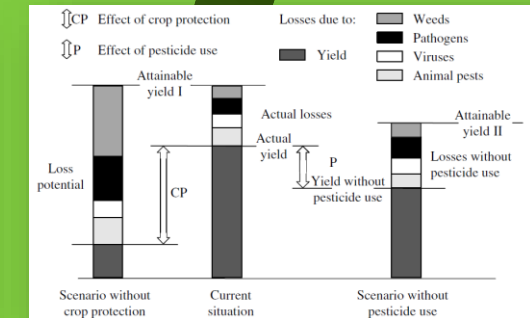
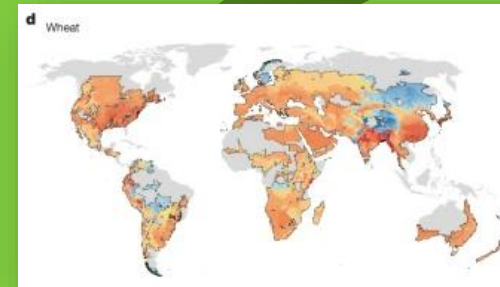
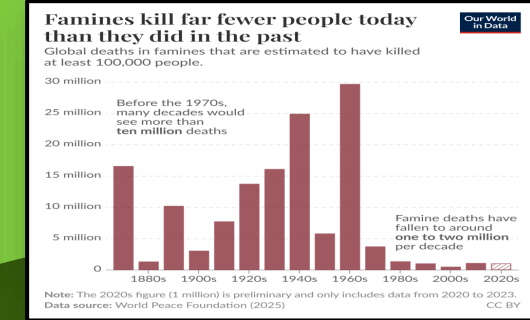
Diagnostic approaches to reducing agent use

- **“See-and-spray” or patch spraying based on disease maps unlikely to be successful**
 - By the time disease is visible it’s already too late!
 - Volatiles?
 - GM sentinels?
- **Focus on disease prediction models**
 - Advice on if/when to spray
- **Model parameters**
 - History, climate/weather, land-use
 - Real-time spore detection technology
 - Image analysis
 - DNA analysis



Conclusions

- Our global food system is not perfect, but it is doing a pretty good job of feeding a still-expanding human population
 - It's not bad and getting worse; it's good and getting better
- However there are many ways in which our food system can improve
 - The development and implementation of new technologies can help in some cases
- Pest control is essential for global food production
 - Synthetic chemistry remains the dominant paradigm, but crop genetics and new types of agent are creating a more diverse landscape of pest control options
 - UV-C, living microbes, RNAi, proteins, natural products
 - Diagnostic and analytical technologies are improving our ability to predict pest pressure and hence inform growers' decision making



EU bans caffeine use in pesticides - because it's 'harmful to humans if swallowed'

Angus Thompson
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Greenpeace launches petition to ban pesticides in food

22nd April 2026



A wide-angle photograph of a cornfield. Two rows of tall, green corn plants with developing tassels frame a central dirt path. In the distance, a tractor is visible on the path. The sky is a vibrant blue with wispy white clouds. The Syngenta logo is centered in the upper half of the image.

syngenta