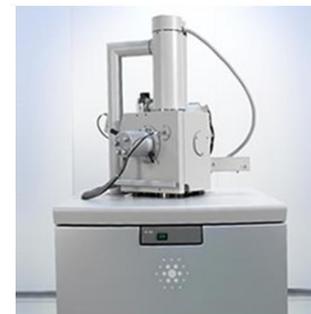


Центр колективного користування науковим обладнанням МІ СумДУ



Обладнання центру:

- Скануючий електронний мікроскоп SEO-SEM Inspect S50-B
- Просвічуючий електронний мікроскоп ПЭМ-125K
- Мікропроцесорний спектрофотометр Lasany LI-722
- Високоєфективний рідинний хроматограф Agilent Technologies 1200
- Рентгенівський дифрактометр ДРОН-3М
- Спектрометр ElvaX Light SDD



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BIOMATERIALS RESEARCH GROUP



?

Why are you against GMO?





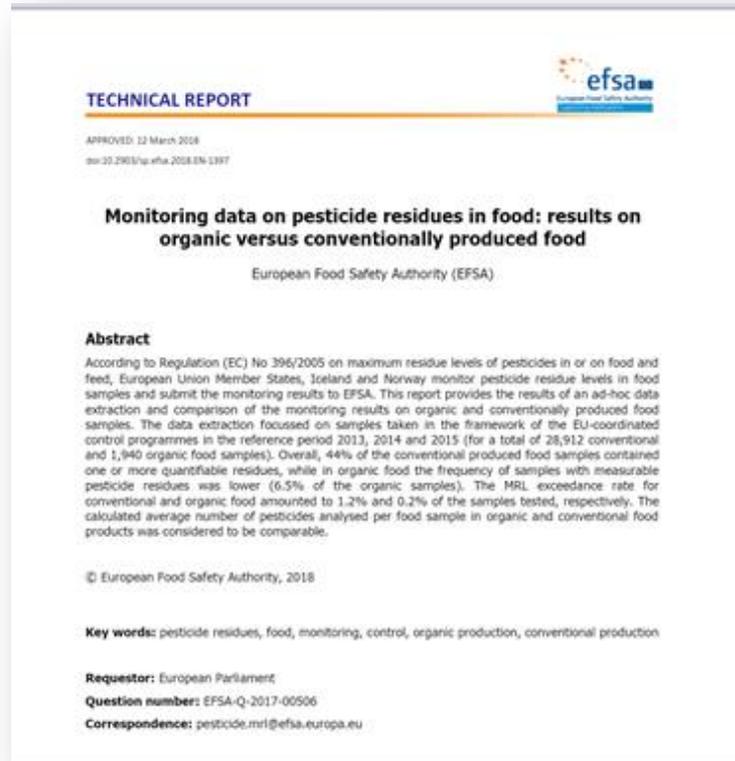
Чи є органічне органічним?

- Пестициди
 - Органік 6,5%+
 - Традиціне 44,5%+
- Перевищення МДР
 - Органік 0,2%+
 - Традиціне 1,2%+



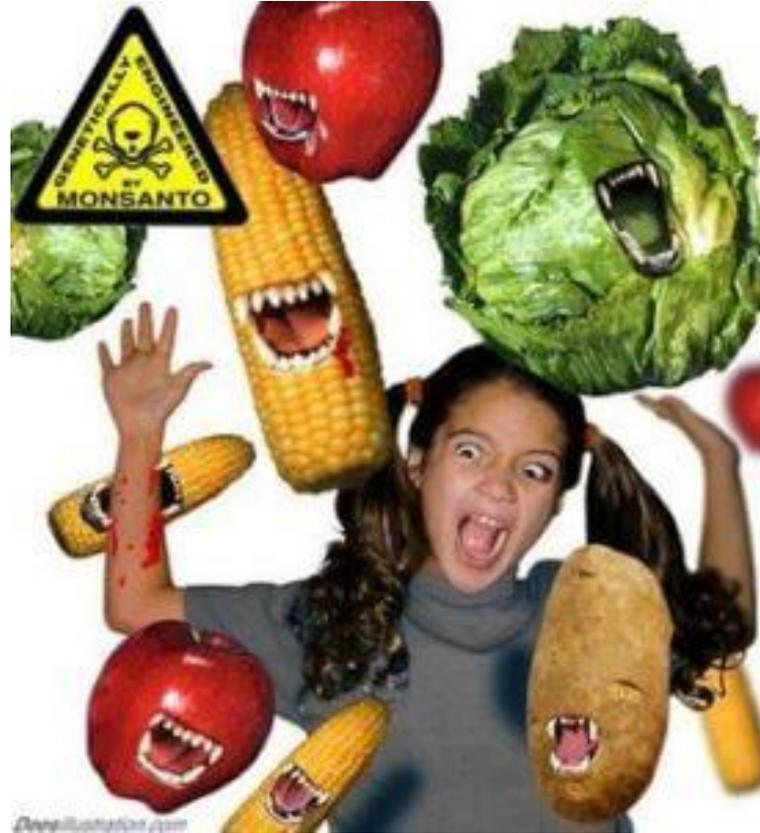
НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ
БІОРЕСУРСІВ І ПРИРОДОКОРИСТУВАННЯ
УКРАЇНИ

Марія Галабурда





<https://www.theguardian.com/environment/2019/oct/31/fishery-collapse-confirms-silent-spring-pesticide-prophecy#img-1>



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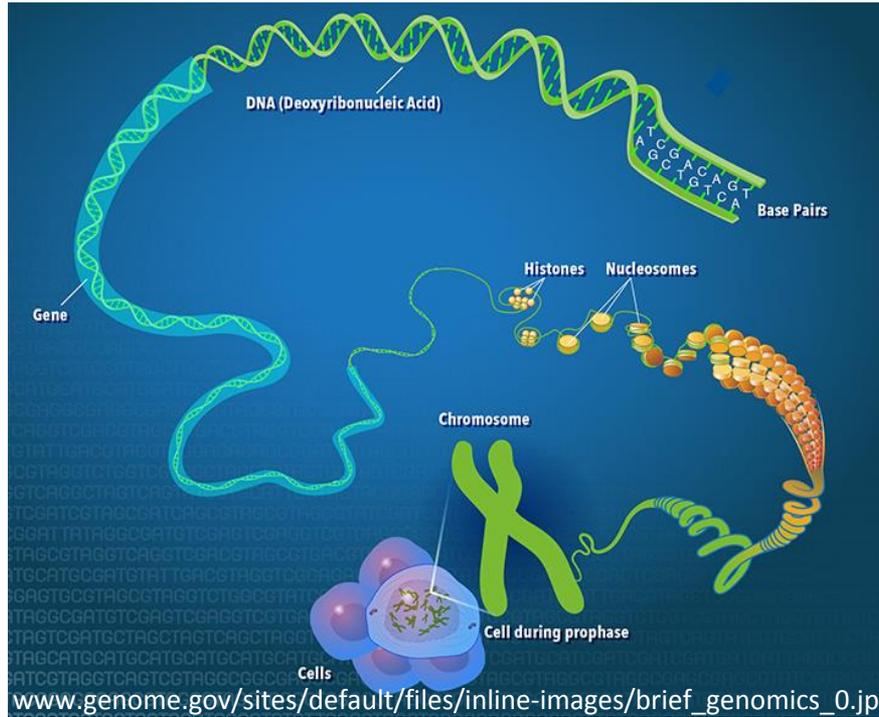


Seriously?





Genes and genomes



15% of the *Drosophila* genome, 35% of the human genome and >50% of the maize genome

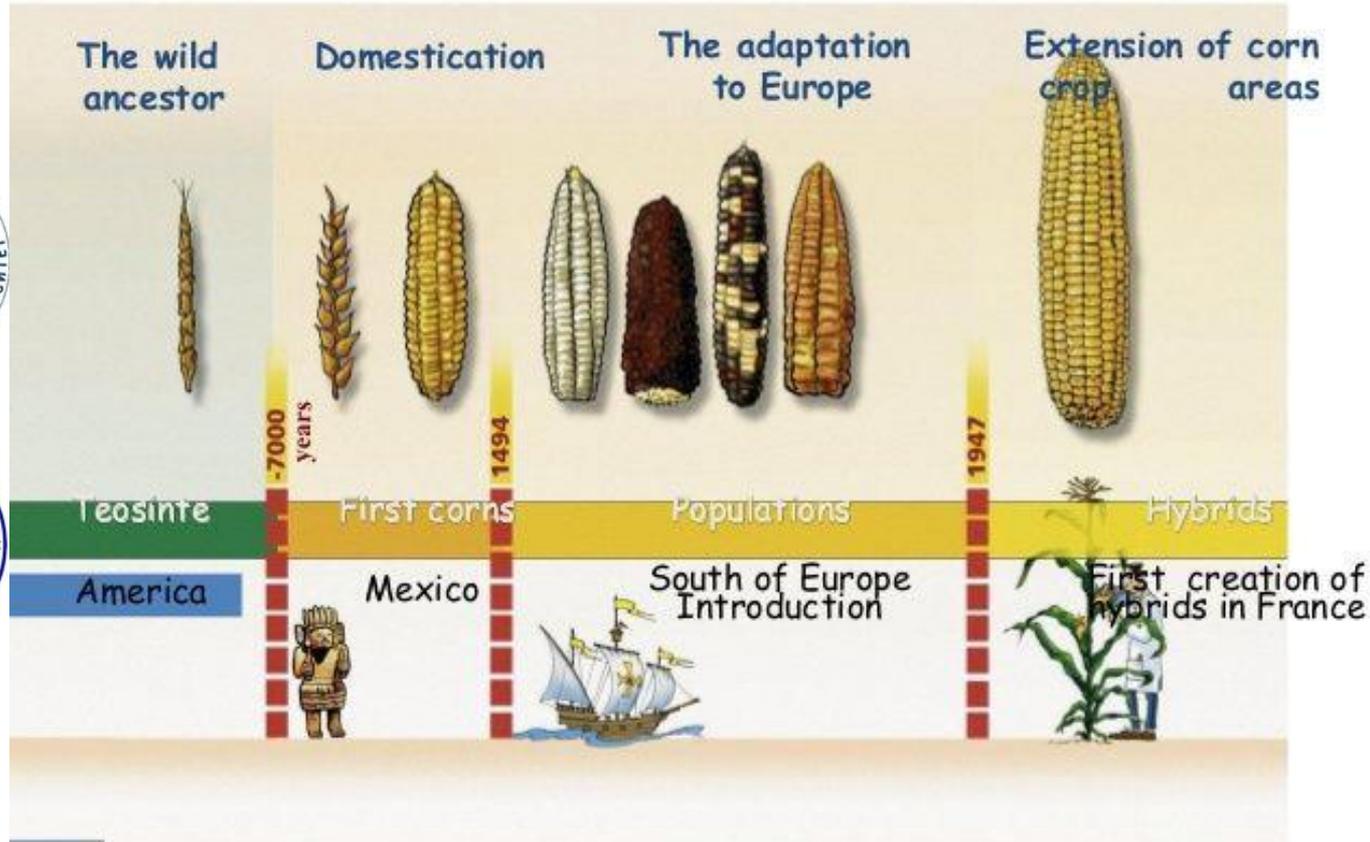
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC117186/>







The evolution of maize (corn)

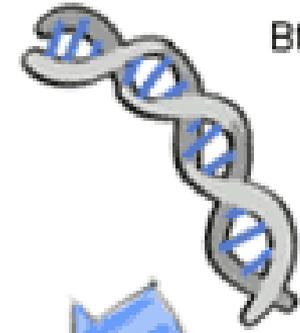


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bacillus thuringiensis



Bt Gene is inserted into crop



Crop is infected by European corn borer

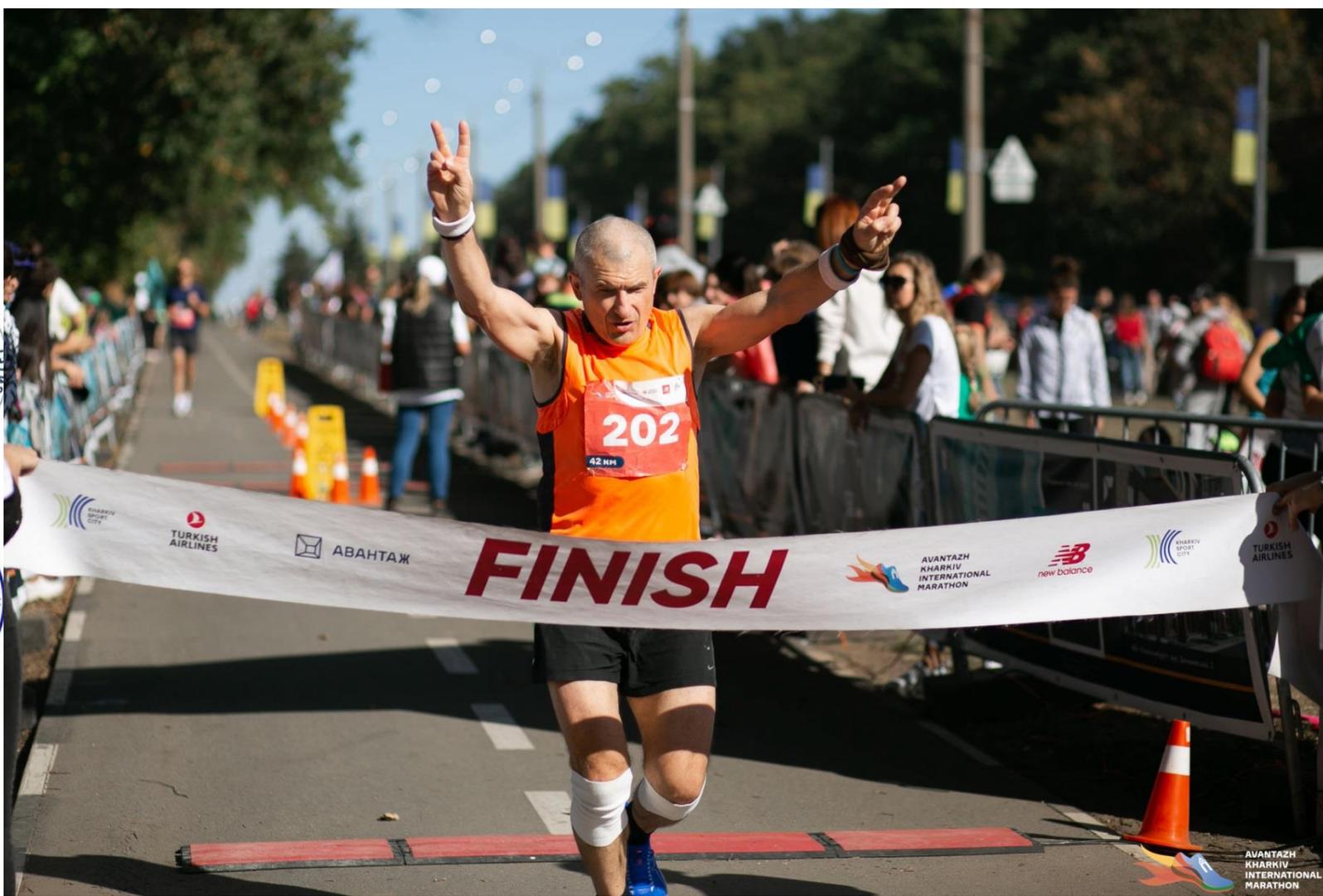


Pest dies when feeding on any plant part



AVANTAZH
KHARKIV
INTERNATIONAL
MARATHON





AVANTAZH
KHARKIV
INTERNATIONAL
MARATHON



Meta – analysys



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A Review of 6,000 Studies Over Two Decades Delivers Its Verdict on GMO Corn

<https://www.sciencealert.com/review-of-6000-studies-over-two-decades-delivers-its-verdict-on-gmo-corn-safety>



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https://en.wikipedia.org/wiki/Golden_rice#/media/File:Golden_Rice.jpg





www.pioneer.com/CMRoot/pioneer/US/images/agronomy/crop_focus/corn/diseases/trichoderma_ear_rot.jpg
www.nationalhogfarmer.com/sites/nationalhogfarmer.com/files/styles/article_featured_standard/public/uploads/2012/10/mycotoxin-cornjpgcropdisplay-ear-rot-purduejpgcropdisplay.jpg?itok=Hhh_Muam



СумДУ



Corn



Soy



Cotton



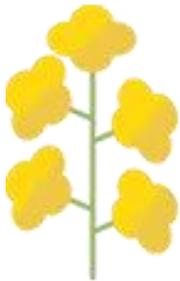
Alfalfa



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Sugar Beets



Canola



Papaya



Apples



Potatoes



Squash



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GMOs Around the World

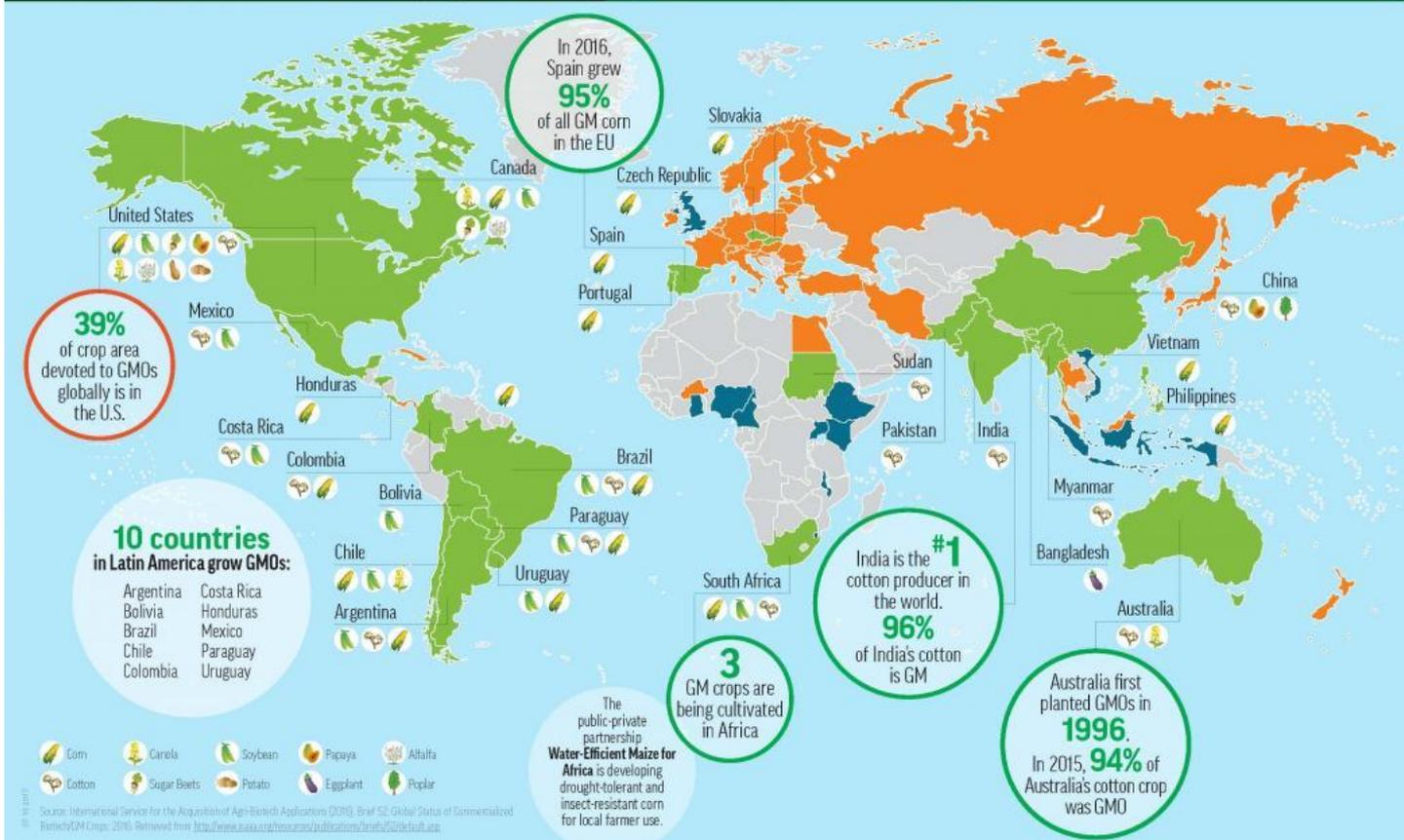


18 million farmers grew GMO crops in 2016. Most were from small farms in developing countries.

26 countries grew GMOs in 2016

19 developing countries grew GMOs

7 industrialized countries grew GMOs



As of 2016, GMOs are **GROWN, IMPORTED, and/or used in FIELD TRIALS** in more than **75 countries**.

GROWING BIOTECH AND GRANTING IMPORT APPROVALS

- | | |
|----------------|---------------|
| Argentina | Mexico |
| Australia | Myanmar |
| Bangladesh | Pakistan |
| Bolivia | Paraguay |
| Brazil | Philippines |
| Canada | Portugal |
| Chile | Slovakia |
| China | South Africa |
| Colombia | Spain |
| Costa Rica | Sudan |
| Czech Republic | United States |
| Honduras | Uruguay |
| India | Vietnam |

GRANTING IMPORT APPROVALS

- | | |
|--------------|-------------|
| Austria | Lithuania |
| Belgium | Luxembourg |
| Bulgaria | Malaysia |
| Burkina Faso | Malta |
| Croatia | Netherlands |
| Cuba | New Zealand |
| Cyprus | Norway |
| Denmark | Panama |
| Egypt | Poland |
| Estonia | Romania |
| France | Russia |
| Finland | Singapore |
| Germany | Slovenia |
| Greece | South Korea |
| Hungary | Sweden |
| Iran | Switzerland |
| Ireland | Taiwan |
| Italy | Thailand |
| Japan | Turkey |
| Latvia | |

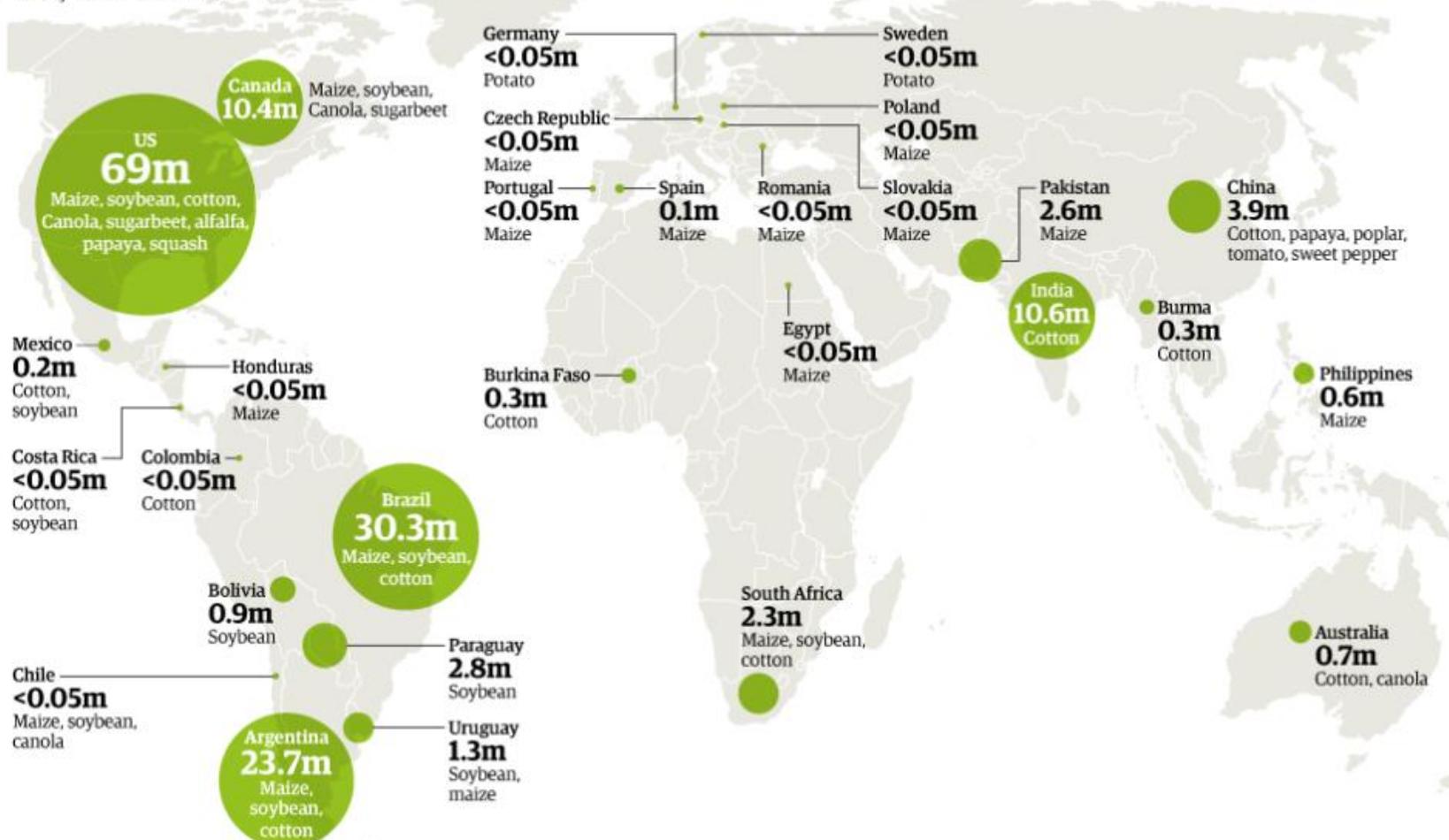
APPROVING RESEARCH FIELD TRIALS

- | | |
|-----------|----------------|
| Cameroon | Malawi |
| Ethiopia | Nigeria |
| Ghana | Swaziland |
| Indonesia | Uganda |
| Kenya | United Kingdom |

Source: International Service for the Acquisition of Agri-Biotech Applications (ISAAA), Brief 52, Global Status of Commercialized Biotech/GM Crops: 2016. Retrieved from <http://www.isaaa.org/publications/briefs/52/01/01/01.aspx>

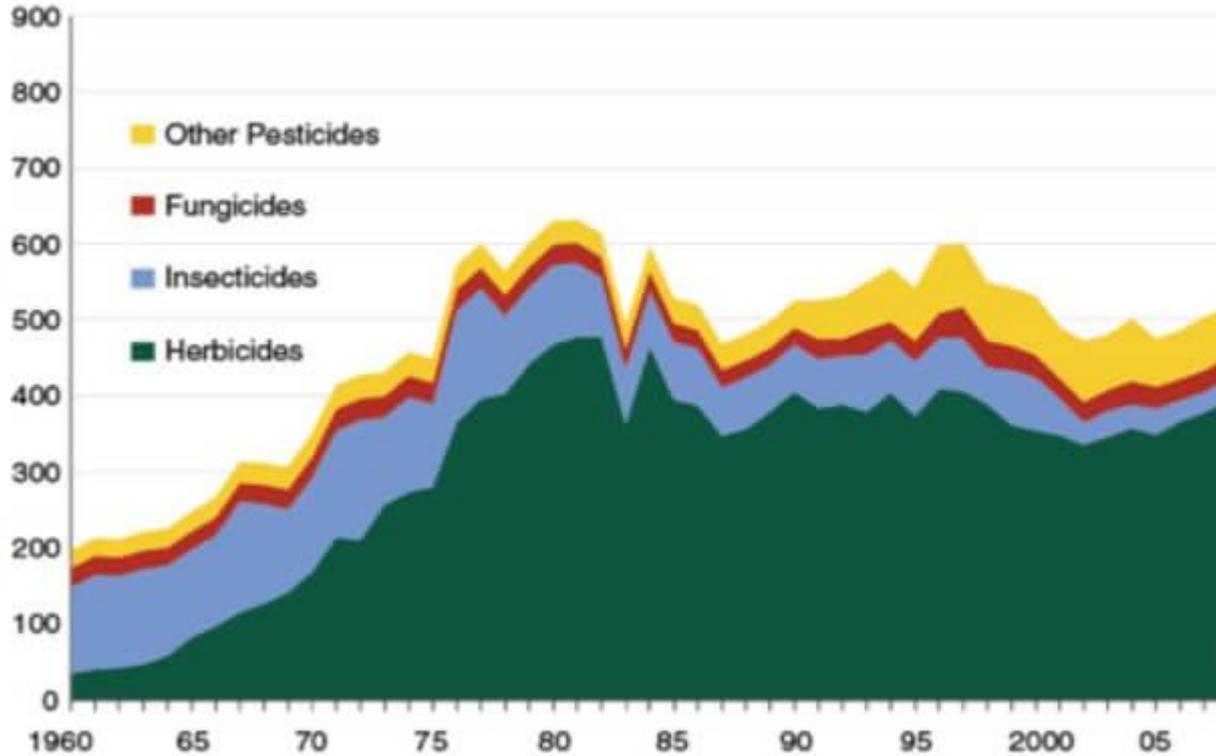
Global status of commercial GM crops

2011, by millions of hectares



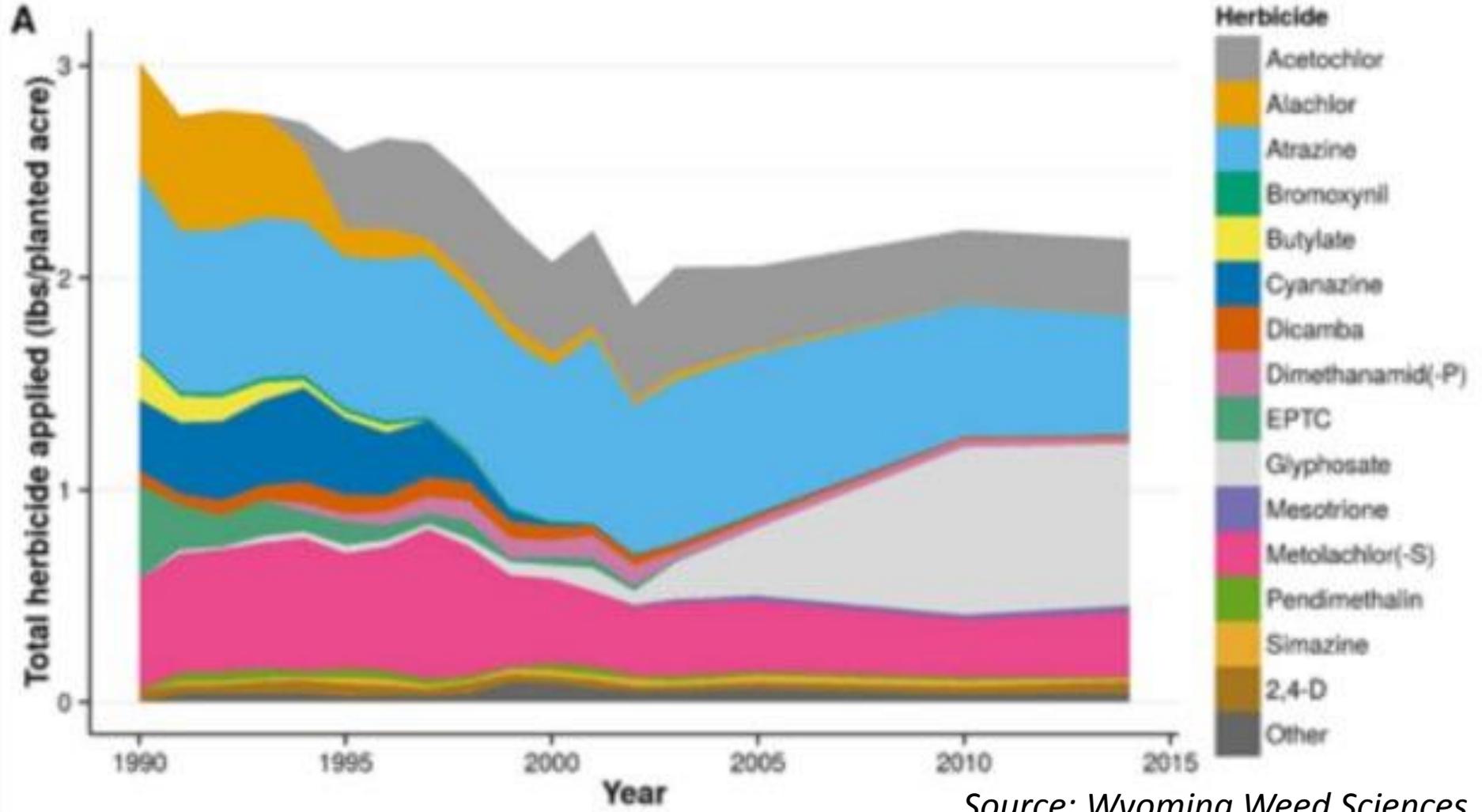
Pesticide use in U.S. agriculture peaked in 1981 (21 selected crops, 1960 -2008)

Million pounds of pesticide active ingredient



Source: USDA, Economic Research Service using USDA, National Agricultural Statistics Service and proprietary data.





Source: Wyoming Weed Sciences



10 REASONS WE NEED BIOTECH FOODS and CROPS



FOODS TWEAKED BY BIOTECHNOLOGY ARE SAFE TO EAT

Over 25 years of independent research, **there is no documented evidence of harm to human health or deaths from consumption of GM foods** since they were introduced to the market.

None. (sources: National Research Council, European Commission)



10 REASONS WE NEED BIOTECH FOODS and CROPS

НИИ ИАС

GENETICALLY MODIFIED FOODS IMPROVE NUTRITION AND HEALTH

The new generation of GM crops—Golden Rice, which delivers **vitamin A enhanced rice, high carotene mustard seed oil, Vitamin A enhanced cassava, enriched sweet potatoes and even edible vaccines**—are just a few innovations awaiting approval. (source: Plant Physiology,

Journal of American College of Nutrition, Gates Foundation)

НИИ ИАС

10 REASONS WE NEED BIOTECH FOODS and CROPS



BIOTECH CROPS CAN HELP ADDRESS THE GLOBAL FOOD CRISIS

Biotechnology has helped farmers grow **311.8 million tons more food in the last 15 years.**

(source: www.croplife.org)



10 REASONS WE NEED BIOTECH FOODS and CROPS

УЧНИЙ ЦЕНТР



CROP BIOTECHNOLOGY HELPS SMALL FARMERS

90% of the 17 million farmers who grow biotech crops are resource-poor with **farms of less than 10 hectares**. The growth rate for biotech crops is at least three times as fast and five times as large in developing countries than industrialized countries. (source: ISAAA, *New York Times*)



10 REASONS WE NEED BIOTECH FOODS and CROPS



BIOTECH CROPS SPUR GLOBAL ECONOMIC GROWTH

Economic benefits of GM crops amounts to an average of over \$130/hectare. In the last 16 years, planted biotech crop acres have increased 100-fold from 1.7 million hectares to 170 million hectares. (source: ISAAA)

10 REASONS WE NEED BIOTECH FOODS and CROPS



FARMING USING GM CROPS REDUCES CHEMICAL USE

Biotechnology saves the equivalent of 521,000 pounds of pesticides each year and helps cut herbicide runoff by 70 percent. (sources: ISAAA, PG Economics)



10 REASONS WE NEED BIOTECH FOODS and CROPS



BIOTECH CROPS INCREASE YIELDS

Productivity in GM crops has delivered gains in some cases that are **7–20% higher than conventional varieties** (which are on average 33% higher than organic yields). (sources: Nature, PG Economics)



10 REASONS WE NEED BIOTECH FOODS and CROPS



BIOTECH CROPS HELP INCREASE INCOME OF POORER FARMERS, REDUCING POVERTY AND MALNUTRITION

As the rate of Indian farmers adopting GM cotton has grown, calorie consumption linked to increased incomes has grown and undernourishment in families has dropped, translating into a **15–20 percent reduction in food insecurity** if all the non-Bt adopters in India alone take to this technology. (source: PLOS)

10 REASONS WE NEED BIOTECH FOODS and CROPS

НИИ ИАС

FARMING WITH BIOTECH CROPS IS SUSTAINABLE

GM crops in general need fewer field operations, such as tillage, which allows more residue to remain in the ground, sequestering more CO₂ in the soil and reducing greenhouse gas emissions. In 2011, **these practices were equivalent to removing 10.2 million cars from the road for one year.** (source: PG Economics)

РАСТУВАНИЈА

10 REASONS WE NEED BIOTECH FOODS and CROPS

МЕДИЧНИЙ ІНСТИТУТ



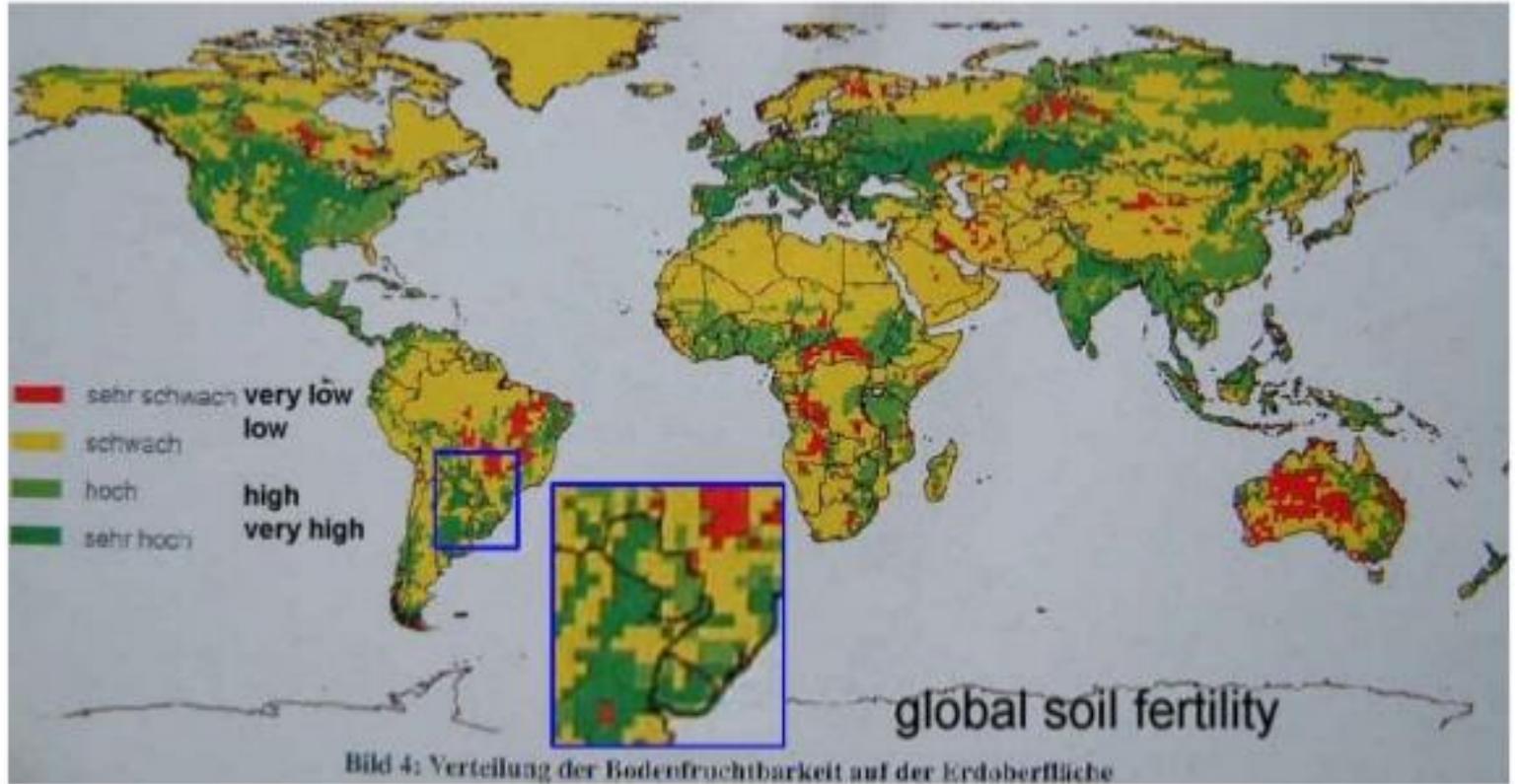
GM CROPS AND FOODS COMPLEMENT CONVENTIONAL AND ORGANIC FARMING

Independent scientists reject claims that GM crops or animals “contaminate” or anyway endanger our food supply or produce dangerous “Trojan genes.” (source: NPR, Nature, USDA)

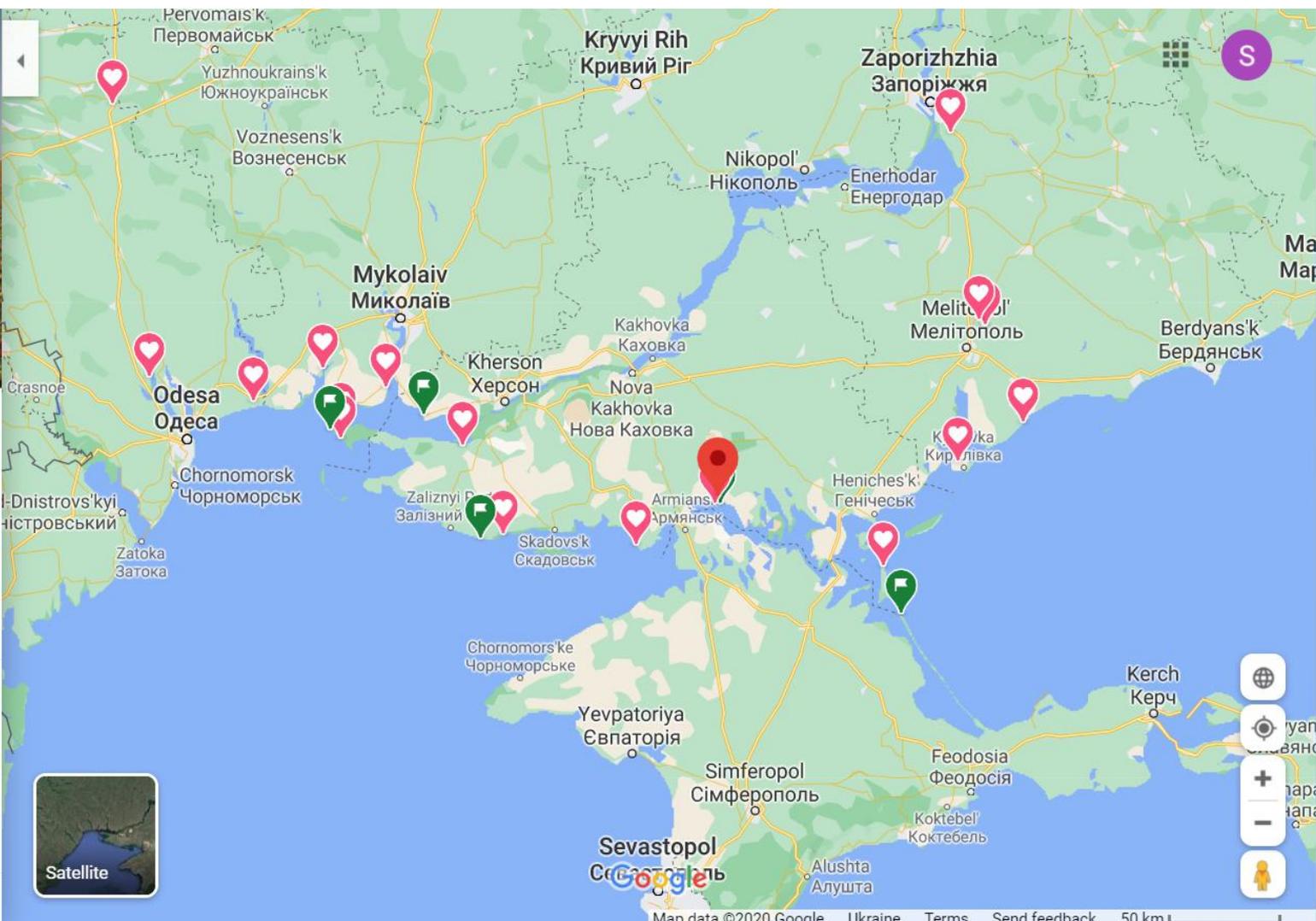




Food production has to double - without using more water, more fertilisers and more land, by 2050, if there is to be





















Genetic engineering



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100 років різниці



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519



The Cow Pock — or — the Wonderful Effects of the New Inoculation! — vide. the Publications of the Anti-Vaccinia Society.







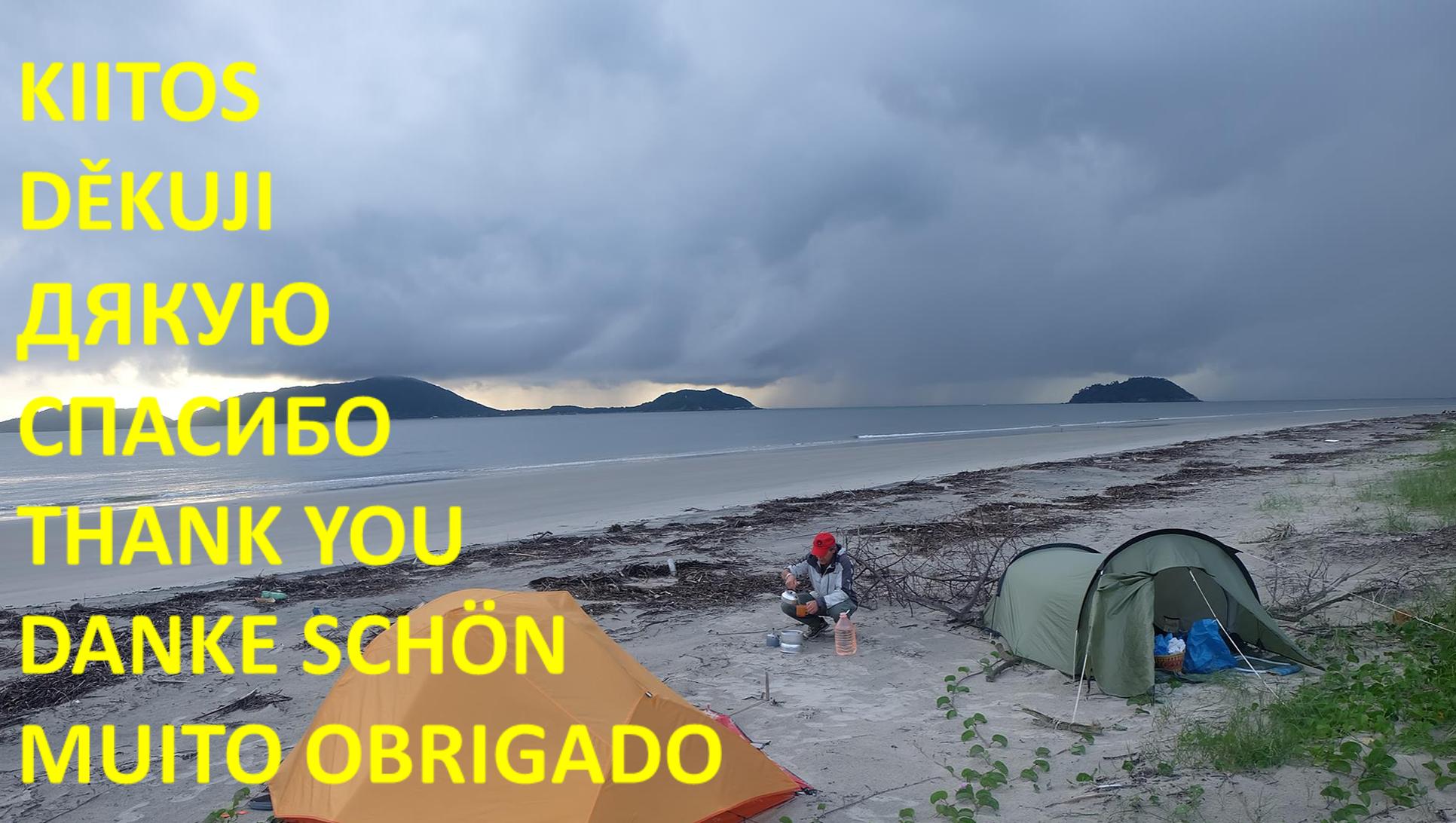
Behold the future of the apple: If the gene inserted into this apple plantlet makes it resistant to the fire blight bacterium, it could help save apple growers tens of millions of dollars a year. Researchers are also working on an apple that could vaccinate children against a virus that is the leading cause of pneumonia.



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**KIITOS
DĚKUJI
ДЯКУЮ
СПАСИБО
THANK YOU
DANKE SCHÖN
MUITO OBRIGADO**





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