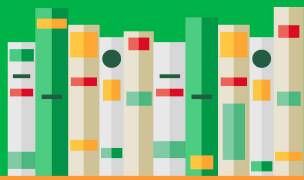


Are GMOs SAFE? YES.

The National Academies of Sciences, Engineering, and Medicine 2016 report reaffirms

Over **900** studies and publications were examined



20+ scientists, researchers and agricultural and industry experts over a 2 year period reviewed animal studies, allergenicity testing, North American and European health data, and more



SAFE.



No substantiated evidence of a difference in risks to human health between current commercially available genetically engineered [GMO] crops and conventionally bred crops.

The National Academies of SCIENCES • ENGINEERING • MEDICINE

Based on **20+** years of data since GMO crops were introduced

Full report available at <http://nas-sites.org/ge-crops/>



Can GMOs HELP PROTECT THE ENVIRONMENT?



THEY ALREADY DO.

Contrary to myths about GMOs hurting the environment, GMOs allow farmers to preserve the land while doing more with less resources.

The Environmental CHALLENGE:

30% POPULATION INCREASE BY 2050 = HIGHER DEMAND FOR

FOOD and FIBER FUEL

2 POTENTIAL PATHS

1 Convert more land, like forests and prairies, into agricultural production

2 Use agricultural technologies like GMOs to increase crop yields on existing farmland

GMOs are ONE SOLUTION

In 2015, GMOs allowed farmers to use

48.2 MILLION less acres of land

to produce the same amount of food, fuel and fiber crops²



Without access to GMOs, farmers would have needed to plant an additional:

18.2 MILLION acres of corn
20.7 MILLION acres of soybeans
7.4 MILLION acres of cotton
1.7 MILLION acres of canola
to keep up with global production levels in 2015⁴

¹ World population projected to reach 9.7 billion by 2050 (2015). Retrieved from: <http://www.un.org/development/desa/news/population/2015-report.html>
² Brookes, G. and Barfoot, P. (2017). GM crops: global socio-economic and environmental impacts 1996-2015. Retrieved from <http://www.pgeconomics.co.uk/>
³ Brookes, G. and Barfoot, P. (2016). GM crops: global socio-economic and environmental impacts 1996-2014. Retrieved from http://www.pgeconomics.co.uk/pdf/Grow_More_on_Less.pdf

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HOW DO WE PRESERVE OUR HABITAT?

GMOs ARE ONE TOOL THAT CAN IMPROVE

crop yields by allowing fewer acres to produce the same amount of food. This can help save critical animal and plant ecosystems including

FORESTS

PARKS

PASTURES

11% In 2015, GMO crops helped preserve the equivalent of 11% of the arable land in the United States.¹ That's nearly two thirds of all the land in America's national parks!

IMPROVED ECOLOGY THROUGH GMOs

DECREASES INSECTICIDE USE

Bt crops are designed to allow important, beneficial bugs to thrive, including:



BEEs



BUTTERFLIES



EARTHWORMS



LADYBUGS

SINCE 1996, GM INSECT-RESISTANT CROPS HAVE LED TO A REDUCTION OF INSECTICIDE USE, INCLUDING:



592.4 million lbs. on cotton crops²



192 million lbs. on maize crops³

^{1,2,3} Brookes, G. and Barfoot, P. (2017). GM crops: global socio-economic and environmental impacts 1996-2015. Retrieved from <http://www.pgeconomics.co.uk/>



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HOW DO GMOs HELP PRESERVE H₂O?

According to the Environmental Protection Agency, drought and water scarcity has been rising steadily since the 1970s and the agency is predicting a significant increase in areas of high drought risk worldwide by the end of the century.¹ To combat this, GMOs are helping agriculture by protecting crops yields during drought and our waterways.



GMOs CAN REDUCE IMPACTS OF DROUGHT ON CROPS

Studies have shown drought tolerant GM corn reduced transpiration by 175% under stress conditions, which allows for better moisture retention to endure drought conditions without additional irrigation.²



...AND CLEANER WATERWAYS

6,400 = Bodies of water affected by soil erosion that can benefit from adopting no-till agriculture with help from herbicide tolerant crops and similar technologies.³ That's an average of 128 lakes, streams and rivers per state in the US!

Future nitrogen use efficient (NUE) GM crops also will help reduce runoff into waterways while potentially increasing yield by 15% more per acre.^{4,5} Applied to rice production, that's an estimated increase of **118 MILLION METRIC TONS OF RICE**—19 times heavier than the pyramid of Giza!



The public-private partnership Water Efficient Maize for Africa is developing GM drought tolerant and insect resistant maize for smallholder farmers in Sub-Saharan Africa.⁶

Have a question about GMOs? Visit <http://GMOAnswers.com>



How GMOs and Sustainable Farming Practices CAN IMPROVE AIR QUALITY

GMOs have reduced **greenhouse gas emissions** on farms globally and can help farmers adapt to and mitigate climate change.

With conservation tillage¹, less carbon dioxide is released from the soil.

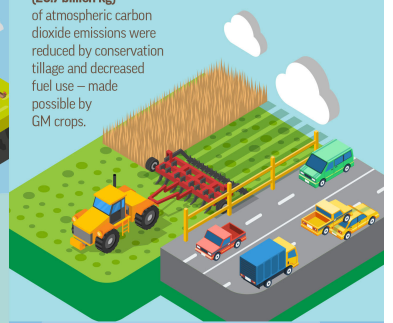
In 2015, **58.9 billion pounds** (26.7 billion kg) of atmospheric carbon dioxide emissions were reduced by conservation tillage and decreased fuel use – made possible by GM crops. **11.9 million fewer cars** on the road for one year.²



According to the USDA, adopting conservation tillage can save at least **3.5 gallons** (13.2 liters) of fuel per acre for farmers because they're spending less time on tractors.³

If all of the corn (GM and non-GM) planted in the U.S. in 2015 was grown with conservation tillage methods, nearly **308 million gallons** (1.2 billion liters) of fuel would be saved.

6.9 billion pounds (3.1 billion kg) of carbon dioxide emissions prevented.⁴ Globally, the benefits could be even greater.



RICE is a staple food for more than half of the world's population.⁵

Research shows that **nitrogen-use-efficient rice** which requires 50% or less the amount of normal fertilizer applications, **reduces nitrogen emissions** (a greenhouse gas) and has shown a **30% average yield increase** across four years of field trials.⁶

¹ Conservation tillage is any method of soil cultivation that leaves the previous year's crop residue (such as corn stalks or wheat stubble) on fields before and after planting the next crop, to reduce soil erosion and runoff. Conservation Practices | Minnesota Conservation Funding Guide, (2016). Retrieved from <http://www.mda.state.mn.us/protecting/conservationpractices/conservationpractices.cfm>
² Brooks, G. and Barlow, P. (2017). GM crops' global socio-economic and environmental impacts 1996–2015. Retrieved from <http://www.pangloss.com.au>
³ Conservation Practices that Save Crop Residue Management (2015). Retrieved from <http://www.usda.gov/pcr/2015/04/01/national-agricultural-conservation-practices-2015-04-01-023637>
⁴ Crop Production 2015 Summary (2016). Retrieved from <http://www.usda.gov/pcr/2015/04/01/national-agricultural-conservation-practices-2015-04-01-023637>
⁵ The global staple. Retrieved from <http://www.usda.gov/pcr/2015/04/01/national-agricultural-conservation-practices-2015-04-01-023637>
⁶ Nitrogen Use Efficient Rice Demonstrates an Average Yield Increase of 30 Percent in Four Years of Field Trials (2015). Retrieved from <http://www.arizona.edu/news/press-releases/nitrogen-use-efficient-rice-demonstrates-average-yield-increase-30-percent-four>



How GMOs Help Reduce FOOD WASTE & LOSS

In the United States, approximately **133 BILLION POUNDS** of food is **WASTED** annually, contributing to **18% of the total U.S. landfill methane** (greenhouse gas) emissions.¹

GMOs help farmers minimize these losses and grow more food using less land.

In 2015, GMOs enabled farmers to use 48.2 million less acres of land to produce the same amount of crops—equivalent to nearly four times the size of America's largest national park, Wrangell-St. Elias National Park and Preserve.²



GM APPLES ARE NON-BROWNING, ELIMINATING THOSE SUPERFICIAL ISSUES that cause people to unnecessarily throw them away.³

In 2010, each American on average **THREW AWAY 17 APPLES**⁴ totaling 1.7 billion pounds of food waste.⁴

GM POTATOES ARE LESS PRONE TO BRUISING AND BLACK SPOTS, meaning fewer potatoes will end up in landfills.

24 BILLION POUNDS FROM WASTE IN 2013⁵ **1,000x** more than THE WEIGHT OF THE EIFFEL TOWER!⁶

20 - 25% of all crop yields in the U.S. are **LOST** to pests, crop diseases, or post-harvest losses. In the developing world, it's as high as 40 - 50%.⁷

GMOs Improve SOIL HEALTH

Healthy soil is fundamental for **CROP GROWTH & FOOD PRODUCTION.**¹

Over the last **20 YEARS**, GMOs **HAVE:**

37% REDUCED PESTICIDE APPLICATIONS & **22% INCREASED CROP YIELDS**²

Herbicide-tolerant GM crops enable farmers to till – or turn over and break up the soil – less often. This has **increased nutrient-rich organic matter up to 1,800 pounds per acre per year.**³

LESS TILLING⁴ =

↑ Soil Moisture ↓ Greenhouse Gas Emissions ↓ Soil Erosion

In the last 150 years, half of the planet's **topsoil has been lost**, largely as the result of erosion. Erosion clogs streams and rivers, hurting fish and other species, and can worsen flooding.⁵

50% Less

GMOs are part of sustainable farming that preserves topsoil, preventing erosion and desertification.⁶

LESS EROSION AND HEALTHIER SOIL, THANKS TO GMOs.

¹ Unlock the Secrets in the Soil: Soil Health. Retrieved from <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/soil/health/>
 Klumper, W. and Qaim, M. A Meta-Analysis of the Impacts of Genetically Modified Crops (2014). Retrieved from <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0111629>
² Conservation Technology Information Center: Facilitating Conservation Farming Practices and Enhancing Environment Sustainability with Agricultural Biotechnology (2010). Retrieved from <http://www.ctic.purdue.edu/media/pdf/FILETechFINAL%20COP%20P%202010%2020PRINT.pdf>
³ Genetic Literacy Project: No Till Agriculture Offers Vast Sustainability Benefits. So Why Do Many Organic Farmers Reject It? (2016). Retrieved from <http://www.geneticliteracyproject.org/2016/03/02/no-till-agriculture-offers-vast-sustainability-benefits-so-why-do-organic-farmers-reject-it/>
⁴ World Wildlife Fund: Soil Erosion and Degradation. Retrieved from <http://www.worldwildlife.org/threats/soil-erosion-and-degradation>
⁵ Conservation Technology Information Center: Facilitating Conservation Farming Practices and Enhancing Environment Sustainability with Agricultural Biotechnology (2010). Retrieved from <http://www.ctic.purdue.edu/media/pdf/FILETechFINAL%20COP%20P%202010%2020PRINT.pdf>

