GMO Answers: Get to Know GMOs

gmo answers

Introducing GMO Answers

gmo answers Open to Your Questions About How Our Food Is Grown

Answering Consumers' Questions

Ask Us Anything About GMOs!

For Example: "How do I know that GMO patents are not creating a monopoly?"

Enter your question

GO

780 questions have already been answered!

OR

Browse All Questions & Answers

Who answers these questions?

Recently Answered Questions

Q: I have heard that Europe does not allow GMO seeds. If I buy pasta from Italy and Oatmeal from Ireland are they GMO free?

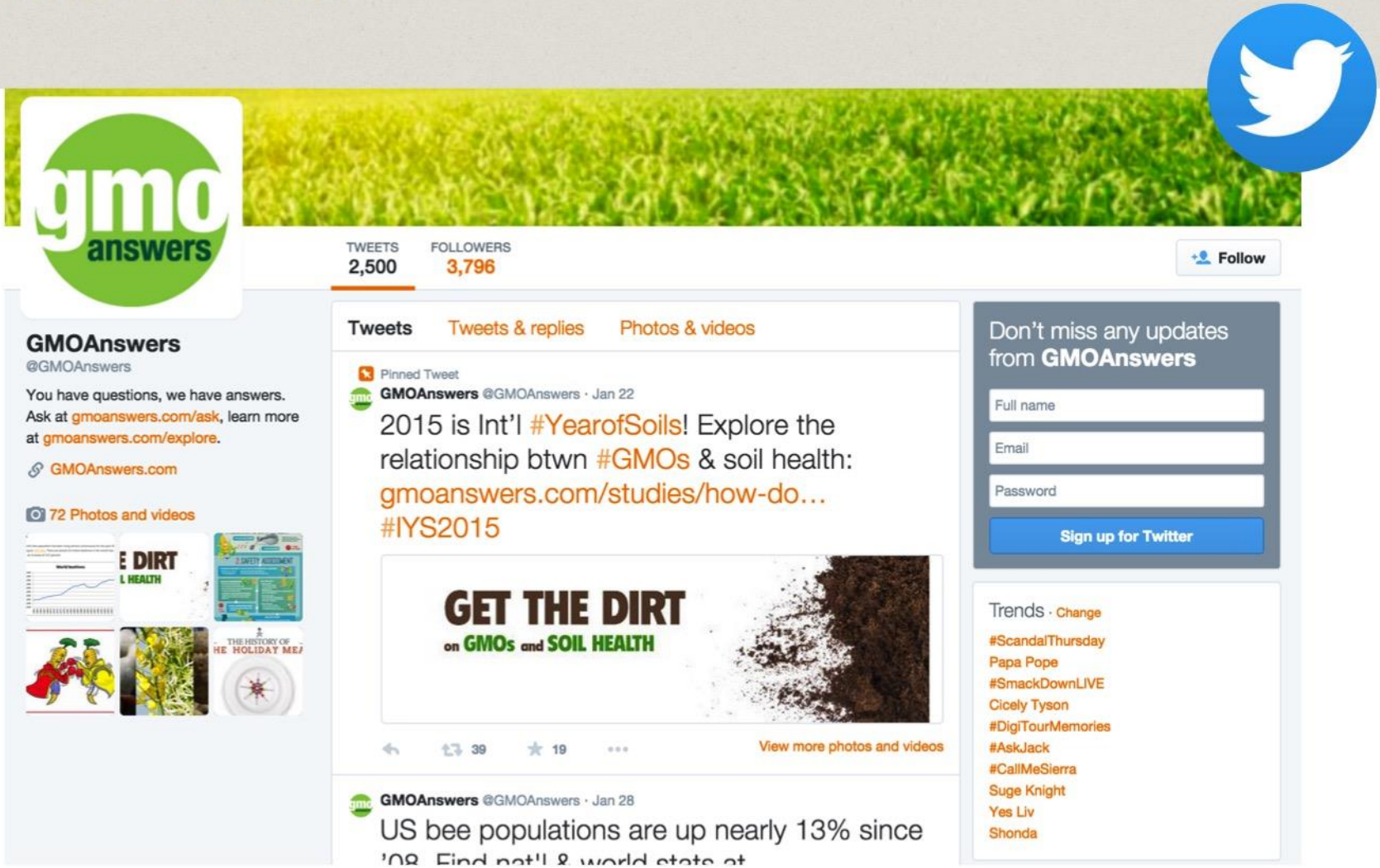
Posted On: Friday, 1/16/2015 3:10 pm

Answered By: Katarzyna Jasik, Communications Manager, Agricultural Biotechnology, EuropaBio on Friday, 1/30/2015 3:24 pm

Notification Preferences

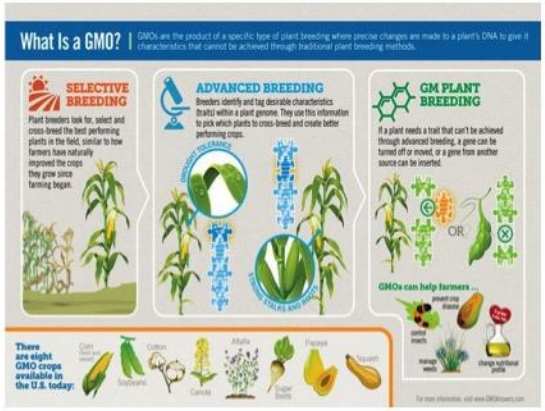
Voting Closed

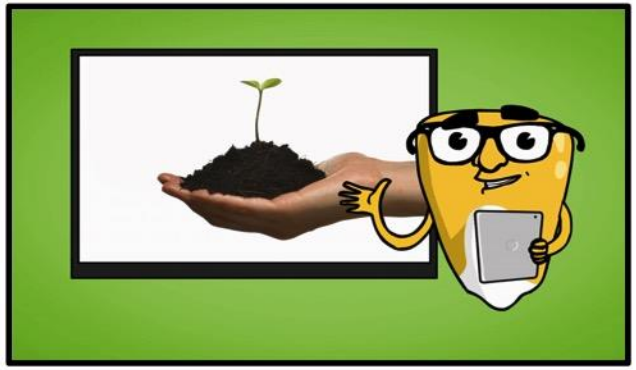
Social Media



Social Media

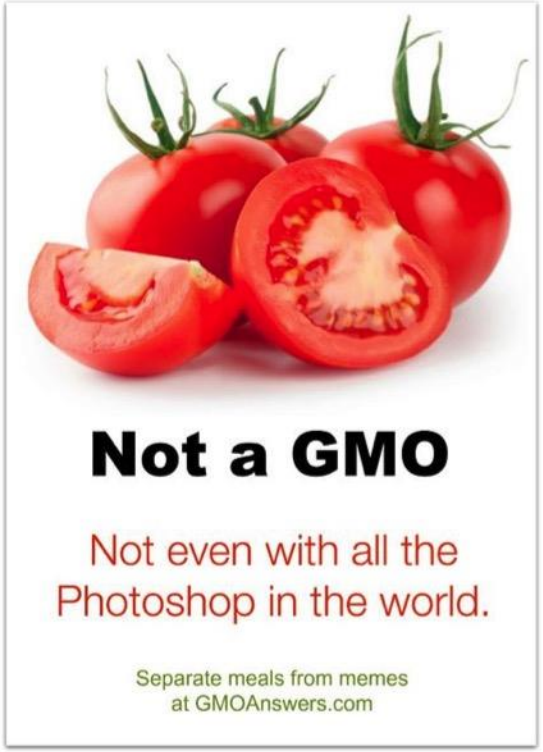
Resources: Materials, Visuals & Videos





Visit GMOAnswers.com/educational-resources to download, print or share.

Resources: Mythbusters



Visit GMOAnswers.com/educational-resources or the GMO Answers' Pinterest page to access mythbusters.

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Get to Know GMOs

Topics we'll cover:

1. Common Misconceptions
2. GMO Basics & Science
3. GMO Answers Resources

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GMO MISCONCEPTIONS

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GMO MISCONCEPTIONS

The top five misconceptions see across social media are:

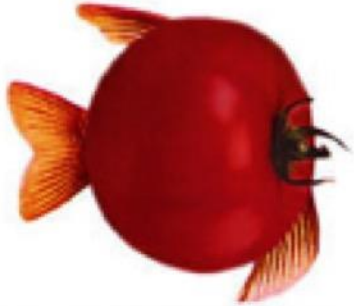
#1. If it's extra-large, seedless, looks weird, tastes bad and feels squishy – it must be a GMO.

#2. GMOs aren't safe and they're only tested by the companies making them.

#3. There is animal DNA in GMOs.

#4. GMOs have pesticides injected into them.

#5. GMO companies force farmers to grow their crops, or sue farmers if GMO seeds or pollen blow into their fields.



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Myth-busting #1

Not a straw.
Not a berry.
Not a GMO.

Get the facts about
the foods you eat
at GMOAnswers.com

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Myth-busting #2

USDA > SAFE TO GROW

EPA > SAFE FOR THE

FDA > SAFE TO EAT

Crops from GM seeds are studied extensively to make sure they are safe - an average of 13 years and $136M[1]

Hundreds of *independent* studies can be researched at Biofortified.org.

Frank N. Foode™

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1 McDougall,P. (2011). The Cost and Time Involved in the Discovery, Development and Authorization of a New Plant Biotechnology Derived Trait.

Myth-busting #3

Myth-busting #4

Get the dirt on GMOs at
GMOAnswers.com

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Myth-busting #5

Farmers choose what seeds to grow based on:

- What is best for their farms
- Local growing environments
- Consumer demand

Many farmers successfully grow, on the same farm, all three of these crops:

GET TO KNOW

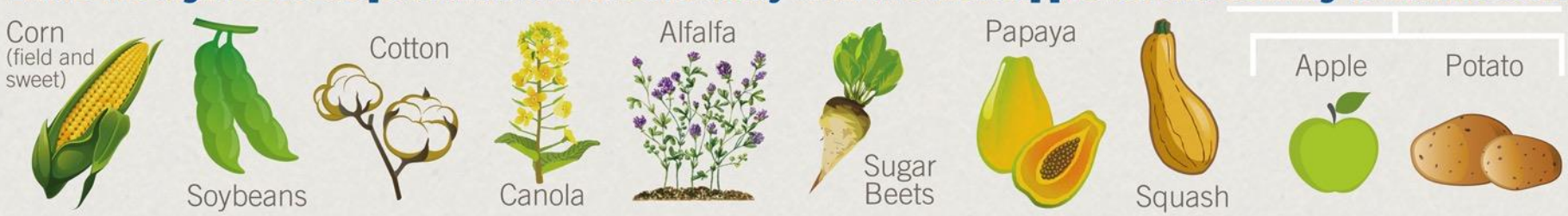
GMO BASICS

GET TO KNOW GMO BASICS

What is a GMO?

GMOs are crops developed with genetic engineering, a more precise breeding technique, that enables someone to take individual traits found in nature and transfer them to another plant, or make changes to an existing trait in a plant.

There are eight GMO crops available in the U.S. today with two more approved and coming to market soon



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GMO BASICS

How We Got Here

THE HISTORY OF GENETIC MODIFICATION IN CROPS

10,000 years ago

Humans begin crop domestication using selective breeding.

1700s

Farmers and scientists begin cross-breeding plants within a species.

1940s and 1950s

Breeders and researchers seek out additional means to introduce genetic variation into the gene pool of plants.

1980s

Researchers develop the more precise and controllable methods of genetic engineering to create plants with desirable traits.

1990s

The first GMOs are introduced to the marketplace.

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watermelon

corn

banana

aubergine / eggplant

carrot

cabbage, kale, broccoli, etc.

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Methods of Plant Breeding

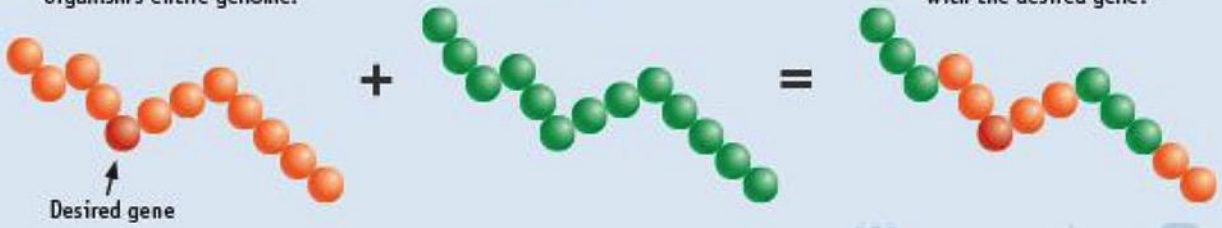
Traditional

The traditional plant breeding process introduces a number of genes into the plant. These genes may include the gene responsible for the desired characteristic, as well as genes responsible for unwanted characteristics.

Donor Variety DNA Strand
DNA strands contain a portion of an organism's entire genome.

Recipient Variety DNA Strand

New Variety DNA Strand
Many genes are transferred with the desired gene.



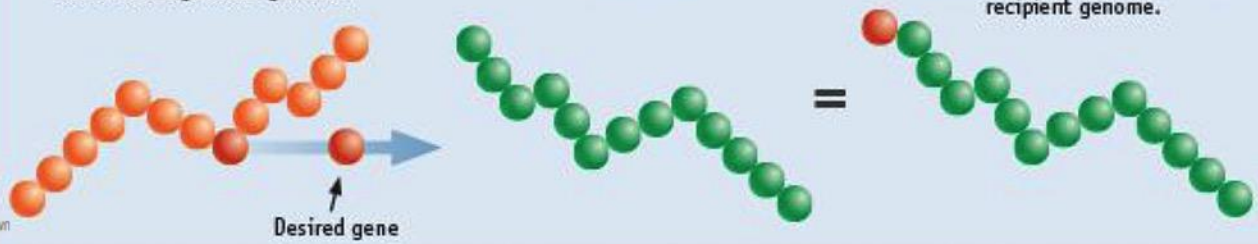
Genetic Engineering

Genetic engineering enables the introduction into the plant of the specific gene or genes responsible for the characteristic(s) of interest. By narrowing the introduction to one or a few identified genes, scientists can introduce the desired characteristic without also introducing genes responsible for unwanted characteristics.

Donor Organism DNA Strand
The desired gene is copied from the donor organism's genome.

Recipient Variety DNA Strand

New Variety DNA Strand
Only the desired gene is transferred to a location in the recipient genome.



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Why GMO? SEED IMPROVEMENT

SEED IMPROVEMENT TECHNIQUE	SELECTIVE BREEDING 10,000 years ago to today	INTERSPECIES CROSSES late 1800s to today	MUTAGENESIS 1930s to today	TRANSGENESIS (GMOs) 1990s to today
What is it?	Combining traits from similar and dissimilar plants by crossing into one genetic background with improved traits	Breeding and tissue culture techniques that permit genetic exchange between plants not crossing naturally	Using chemicals or radiation on seeds to change DNA and occasionally induce a favorable trait	Adding a specific, well-characterized gene to a new seed to transfer a specific trait
Examples	 Almost everything we eat	 Pluots, tangelos, some apples, rice and wheat	 Many plants and fruits including pears, apples, rice, yams, mint, some bananas	 Alfalfa, canola, corn (field and sweet), cotton, papaya, soybeans, squash, sugar beets, apples & potatoes approved and coming to market soon
Improved by breeding?	YES	YES	YES	YES
How many genes are affected?	10,000 to 300,000+	10,000 to 300,000	Random and unknown, likely thousands	1 to 3
Do we know which genes in the seed are affected?	NO	NO	NO	YES
Research and development time?	5 to 30 years	5 to 30 years	5+ years	5 to 10 years
Tested by regulatory agencies to ensure safety for people, animals and the environment?	NO	NO	NO	YES
Can the seeds be patented?	YES	YES	YES	YES
Approved for non-GMO and organic farming?	YES	YES	YES	NO
Are people asking for labeling?	NO	NO	NO	YES

THIS CHART COMPARES AND CONTRASTS MODERN METHODS OF SEED IMPROVEMENT.

How do we create new and improved varieties of plants? It starts with the seed. Plant breeders and scientists work together to create new varieties to address evolving challenges to farming and changing consumer preferences. Humans have been central in seed improvement for over 10,000 years, and in the last 100 years our understanding of genetics has accelerated and enabled new seed improvement techniques. Compared to earlier methods, breeders can now make improvements to seeds by moving more precisely one or a few genes into a seed.

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Sourced by Dr. Kevin M. Folta, Professor and Chairman, Horticulture Sciences Department, University of Florida, GMOAnswers.com and Scitable by Nature Education.
Visit GMOAnswers.com for more information.

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Why GMO?

Insect resistance	**Season-long protection against target pests, reduces the need for pesticide applications, and lowers input costs.**
Drought resistance	Ability to grow in much drier areas, conserving water and other environmental resources.
Herbicide tolerance	Fight weeds by applying herbicides only when needed and enabling farmers to use no-till production methods that preserve topsoil, prevent erosion, and reduce carbon emissions.
Disease resistance	With GM, the Hawaiian papaya industry was able to recover from the devastating papaya ringspot virus that had crippled the industry.
Enhanced nutritional profile	High-oleic soybeans have been genetically modified to produce oil with more monounsaturated fat, less saturated fat and little-to-no trans fat. Other GM crops are still being developed for nutritional improvement, including Golden Rice, which includes β-Carotene that could deliver vitamin A to children in developing nations.

How is a GMO made?

https://www.youtube.com/watch?v=2G-yUuiqIZ0

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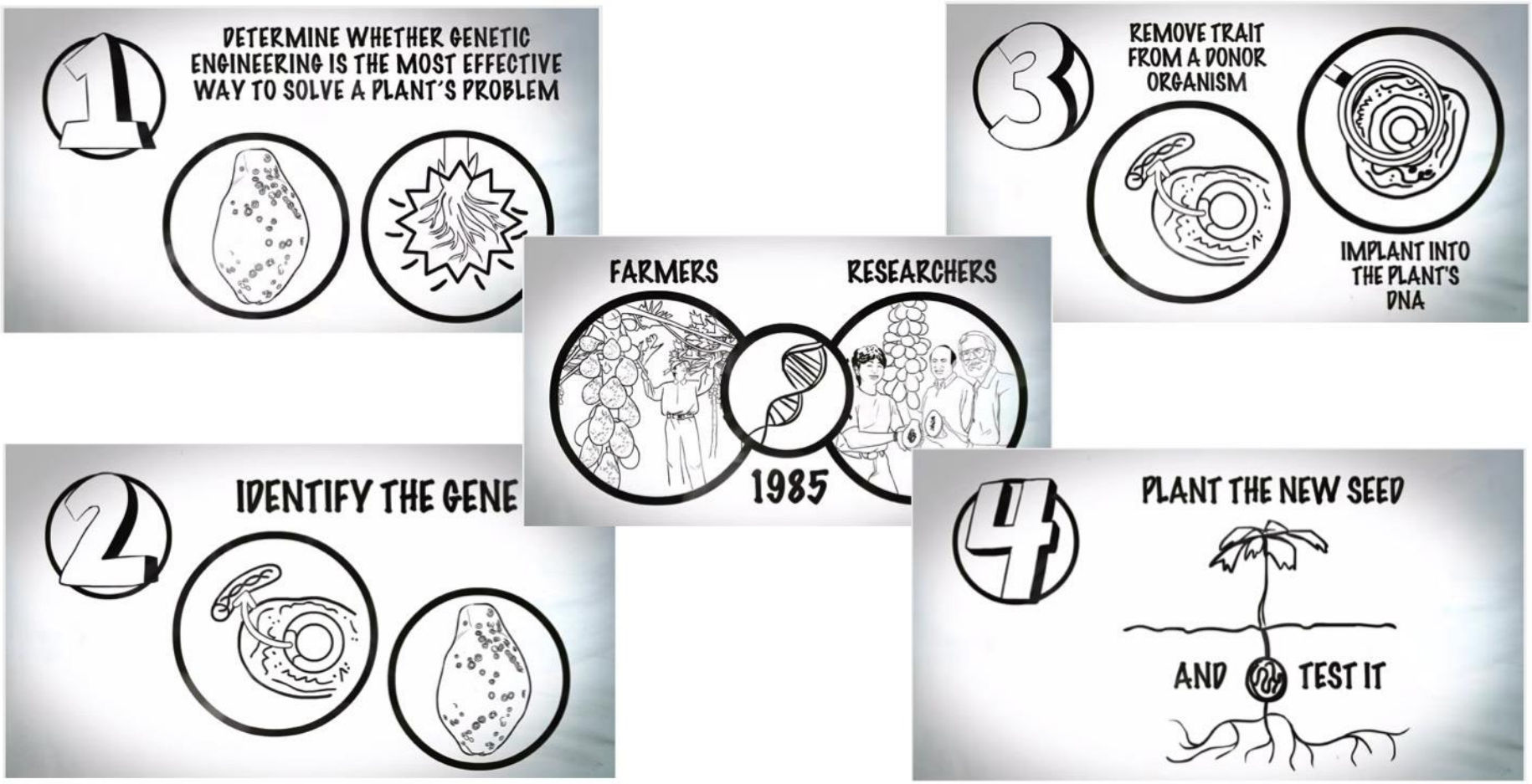
How is a GMO made?



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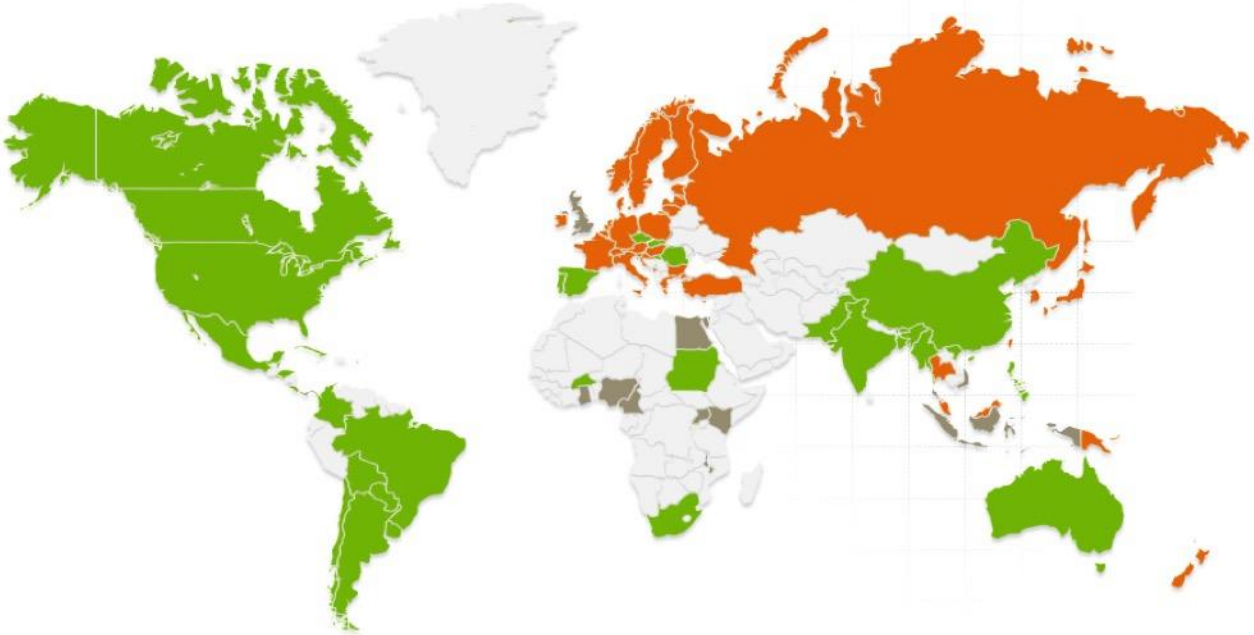
Who grows GMOs?

AS OF **2014**, GMOS ARE **GROWN, IMPORTED,** AND/OR USED IN **FIELD TRIALS** IN **70 COUNTRIES.**

Growing Biotech and Granting Import · Granting Import Approvals · Approving Research Field Trials



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How do we ensure that GMOs are safe for use and consumption?

- GMO crops are studied extensively to make sure they are safe for people, animals and the environment
- GM seeds take an average of $136 million and 13 years to bring to market because of research, testing and regulatory approvals conducted by government agencies in the United States and around the world.[1]

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1 McDougall,P. (2011). The Cost and Time Involved in the Discovery, Development and Authorization of a New Plant Biotechnology Derived Trait

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GMO Safety: Safe to Eat

- GMOs available today are *as safe as* their non-GMO counterparts.
- They do not cause new allergies, cancer, infertility, ADHD, autism or any other diseases or conditions.
- The safety of GMOs has been affirmed by:

NATIONAL ACADEMY OF SCIENCES

FAO FIAT PANIS

World Health Organization

AMA AMERICAN MEDICAL ASSOCIATION

AAAS ADVANCING SCIENCE, SERVING SOCIETY

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GMO Safety: Safe for the environment

Biotech crops have reduced agriculture's environmental footprint:

- Increased yield on current land prevents further deforestation and protects ecosystems
- Fewer pesticide applications
- No/reduced tillage with GM HT technology means less tractor fuel consumption and emissions

"In 2013, the permanent CO2 savings from reduced fuel use associated with GM crops was 62 billion pounds. This is equivalent to removing 12.4 million cars from the road for a year."

- Graham Brookes, Agricultural Economist, PG Economics Ltd

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GMO Safety: Safe to Grow

When testing, researchers look for any difference between the GM and non-GM plants to make sure the GM variety grows the same as the non-GM variety.

They are also tested to make sure they do not unintentionally harm non-target, beneficial insects, like honey bees and ladybugs.

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GMO BASICS

What do the GMOs of the future look like?

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LOOKING FOR MORE INFORMATION?

GMO Answers is a resource for information about GMOs and biotechnology in agriculture.

Explore: Visit the Explore the Basics section of our website, which offers information about GMOs and agriculture in a simple, visual and user-friendly format.

Ask: Visit our Ask section to submit a question and have it answered by an independent or company expert.

Engage: Join the conversation by posting a comment and participating in a constructive dialogue with other members of the community.

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