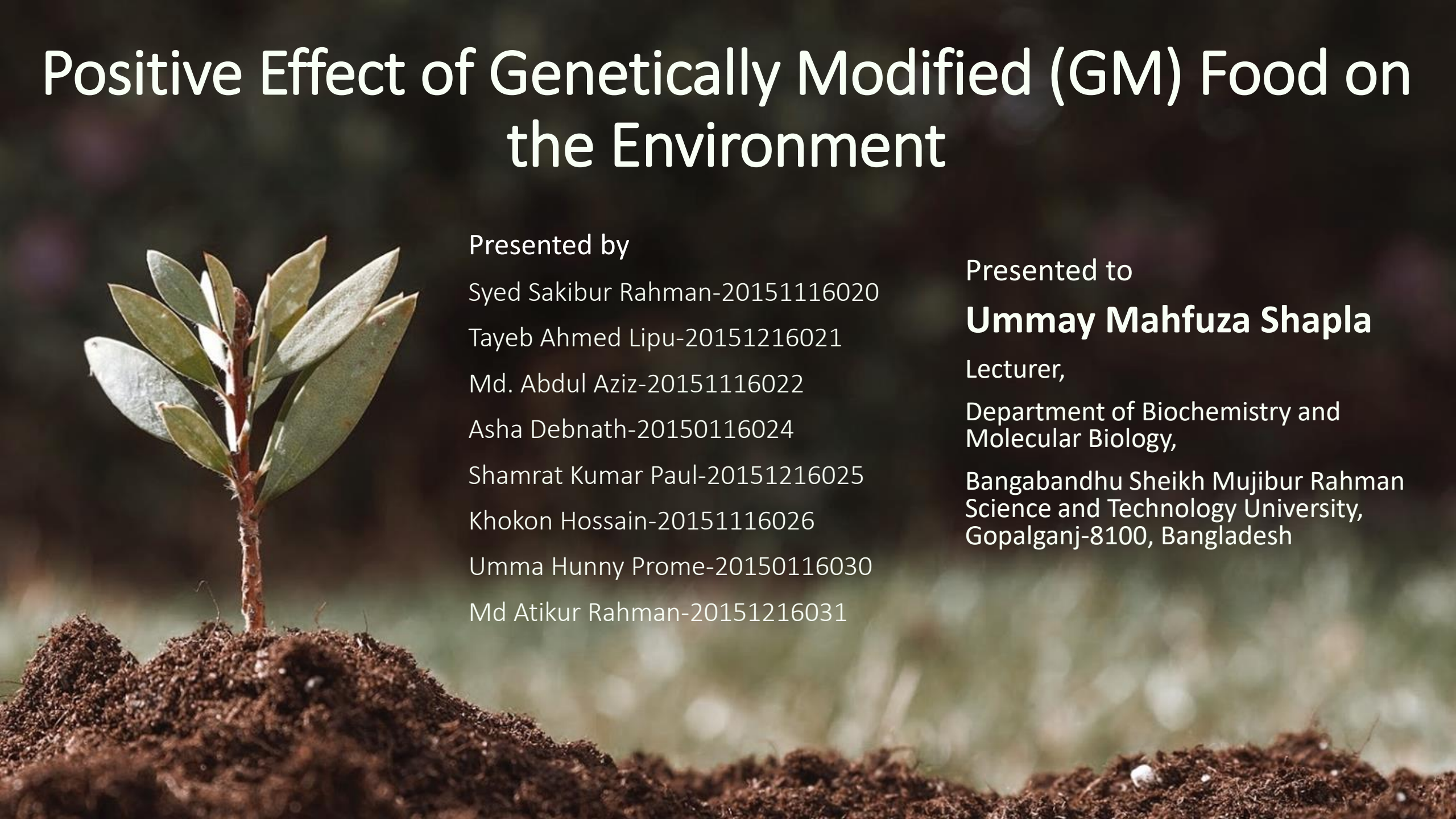
Positive Effect of Genetically Modified (GM) Food on the Environment



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What is GMO?

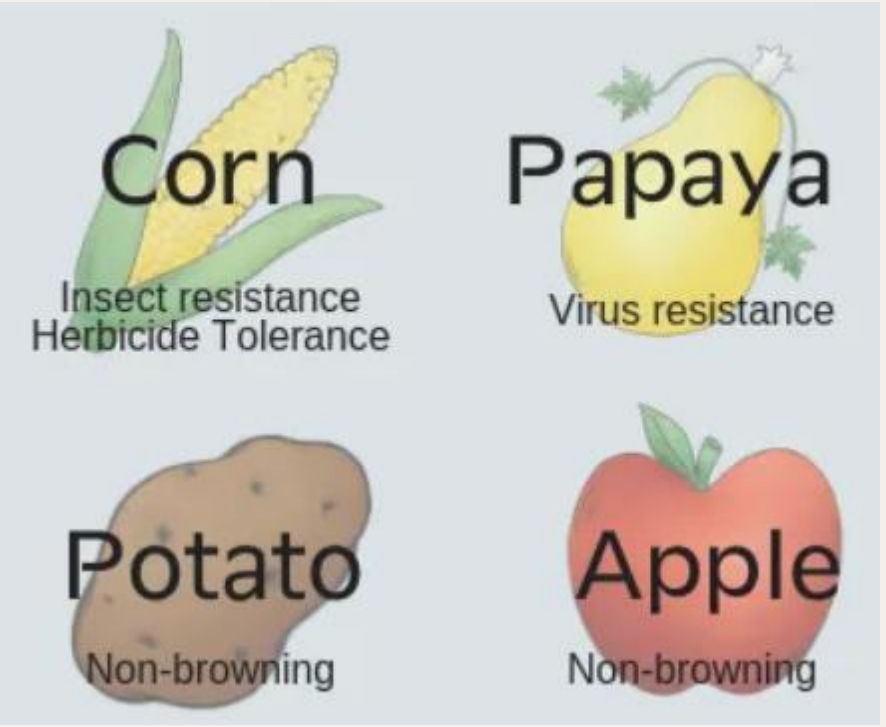
- **GMO stands for Genetically Modified Organism.**

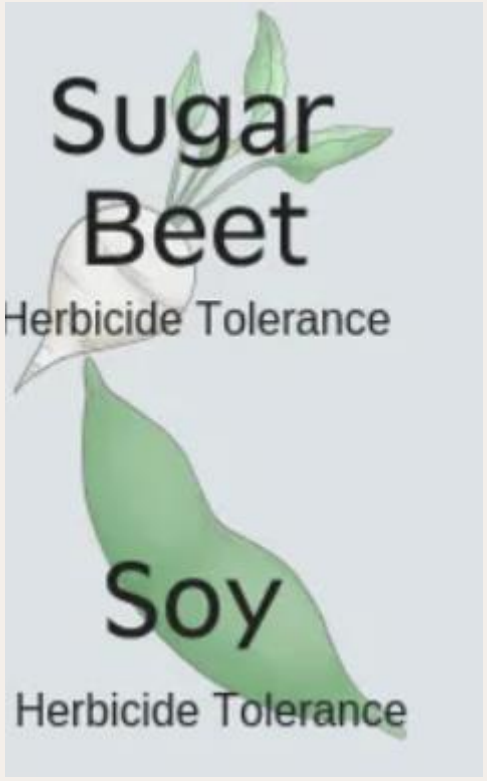
- Different countries and different labels define GMO differently.

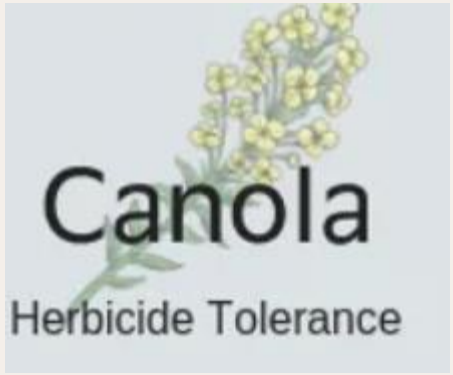
- GMOs are organisms that have had a gene or **genes added** or **removed** by scientists, giving or removing a characteristic or trait.
    - For example, scientists could give a crop the ability to grow more **quickly**, withstand **extreme weather**, have a **different color**, or resist pests.

A list of GM foods:

- ❑ **PAPAYA**
- ❑ **POTATO**
- ❑ **SOY**
- ❑ **SUMMER SQUASH**







- ❑**ALFALFA**
- ❑**APPLE**
- ❑**CANOLA**
- ❑**CORN**

What traits or characteristics do GM food have?

HERBICIDE TOLERANCE

DECREASES THE WORK AND TILLAGE NEEDED TO REMOVE WEEDS.

INSECT RESISTANCE

DECREASES THE AMOUNT OF PESTICIDE USED AND IMPROVES YIELDS.

VIRUS RESISTANCE

DECREASES THE AMOUNT OF PESTICIDE USED AND IMPROVES YIELDS.

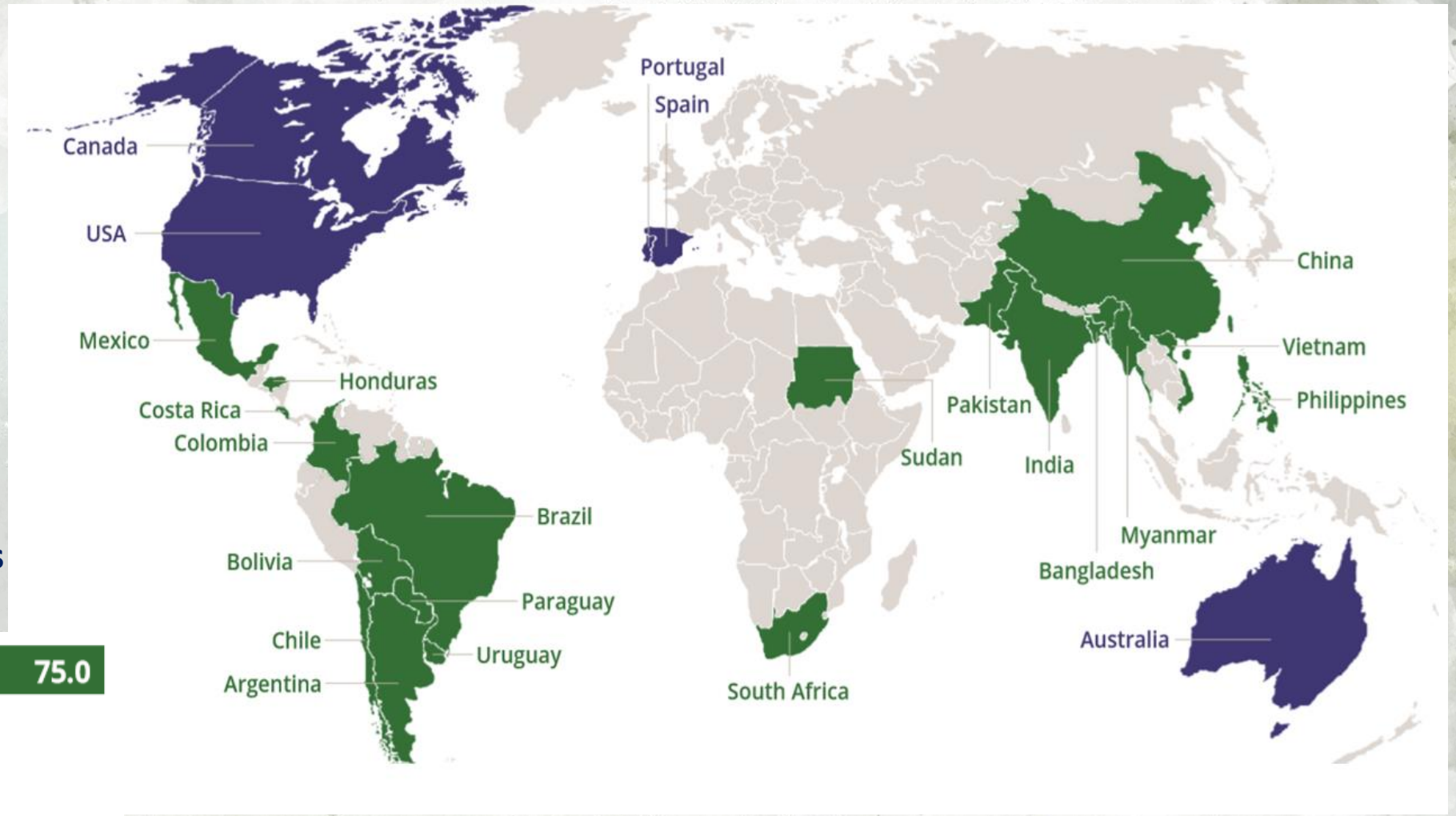
GM Foods and their modification:

Food	Modification
Soybeans	**Herbicide resistant** gene taken from **bacteria** inserted into **soybean**.
Corn	**New genes** added/transferred into **plant genome**.
Tomatoes	A **reverse copy of gene** responsible for the production of Polygalacto-uranase (**PG enzyme)** added into ***plant genome***.
Sugarcane	**New genes** added/transferred into **plant genome.**
Rice	**“Golden rice”** three new genes implanted: **two** from **daffodils** and **third** from a **bacterium.**

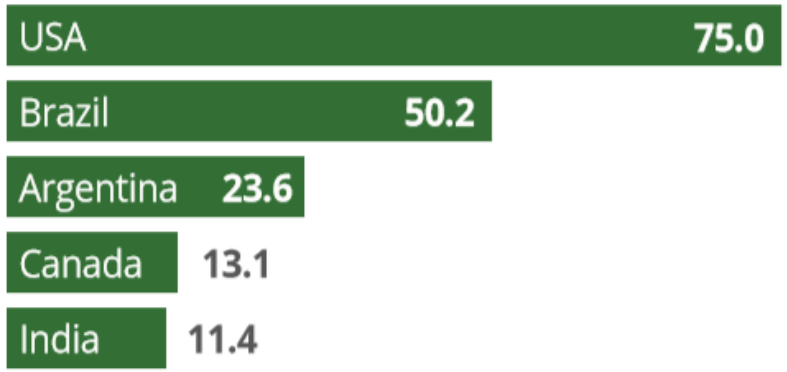
Where are GM crops grown in the world?

19
DEVELOPING COUNTRIES

5
INDUSTRIAL COUNTRIES



top 5 countries growing GM crops in 2017 (Million hectares)



GMOs help to protect the environment!

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

THE ENVIRONMENTAL CHALLENGE:

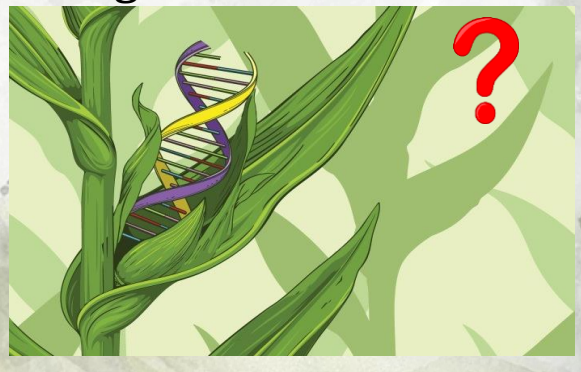
20% **population increase by 2050 &**

HIGHER DEMAND FOR

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 really give solution!

In **2014** GMOs allowed farmers to use

52 million less acres of land

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

that's equivalent to all the farmland in Iowa and Missouri.

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

GMOs improve SOIL HEALTH

- **Healthy soil is fundamental for**

CROP Growth & **FOOD** production.

- **Herbicide-tolerant GM crops** enables farmers to till-or turn over and break up the **soil-less often.**

- **Increased nutrient-rich organic matter up to 1800 pounds per acre per year.**

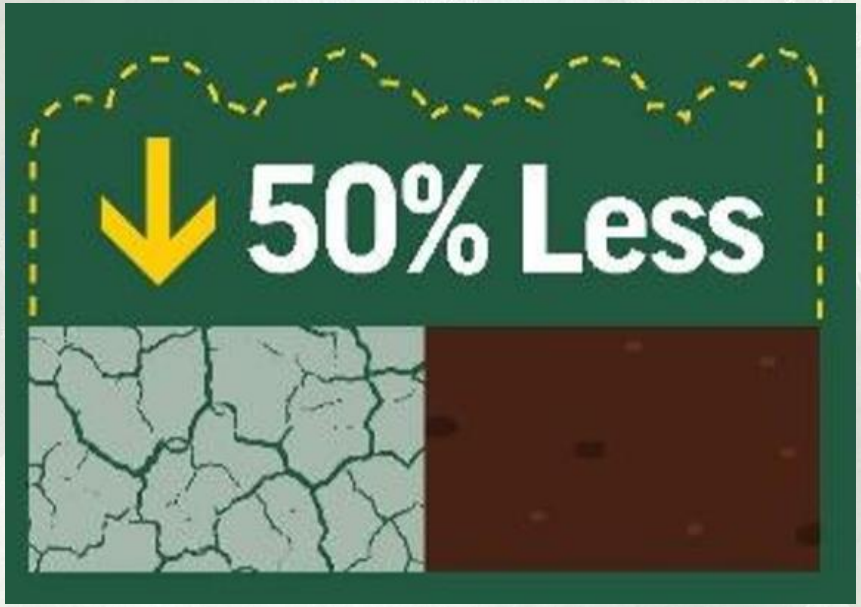
- **Over the last 20 YEARS,**

GMOs Have:

Increased Crop Yields

GMOs improve SOIL HEALTH

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



LESS EROSION & HEALTHIER SOIL

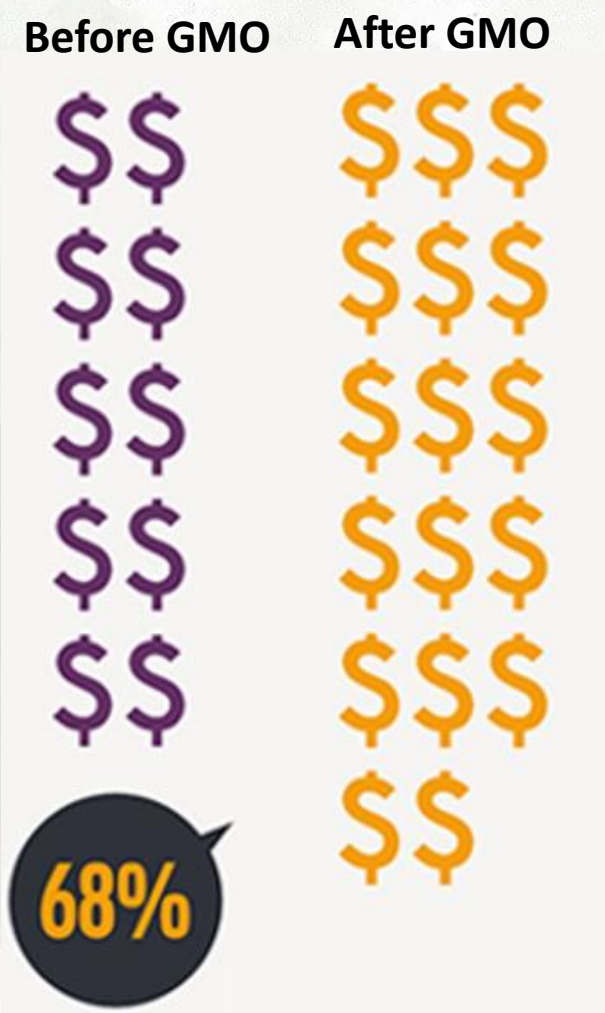
THANKS TO GMOs.

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

Impacts of GMOs on crop production:

Reduction in Pesticides

Increase in yields



Increase in farmer's income

How GMOs can Improve air quality?

- According to the USDA, adopting **conservation tillage** can save at least **13.2 liters** of fuel per acre for farmers because they're spending less time on tractors.
- If all of the corn (GM and non GM planted in the US in 2015 was grown with **conservation tillage** methods **1.2 billion liters** of fuel would saved.

- **3.1 billion** kg of **carbon-di-oxide** emissions prevented globally. The benefits could be even greater.

How GMOs can Improve air quality?

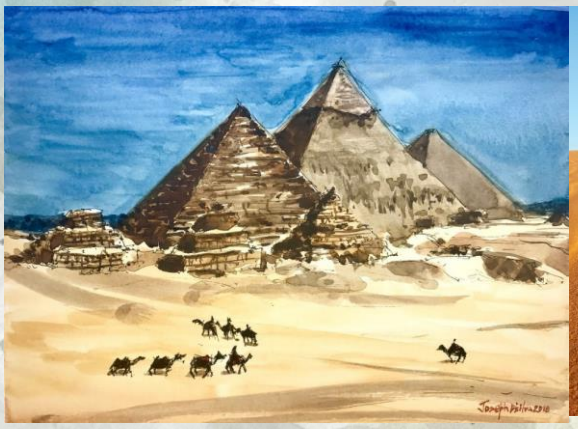
- With **conservation tillage**, **less carbon dioxide** is released from the soil.
- In 2015, **26.7 billion** kg of atmospheric **carbon dioxide** emissions were reduced by **conservation tillage** and decreased fuel use – made possible by **GM crops.**
- Nearly **11.9 million** fewer cars on the **road** for one year.

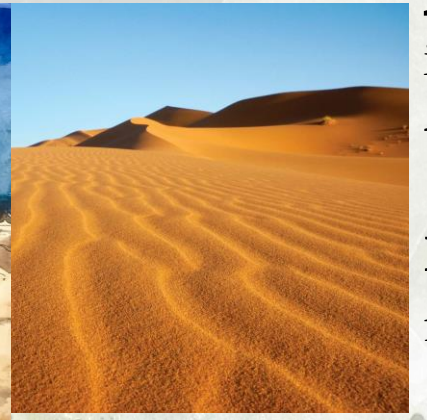
- **Rice** is a staple food for **more than** half of the world's population.
- Research shows that **nitrogen-use-efficient rice** which requires 50% or less the amount of normal fertilizer applications.
- It **reduces nitrogen emissions** (a greenhouse gas) and has shown a **30% average yield increase** across four years of field trials.

GMOs help to preserve water:

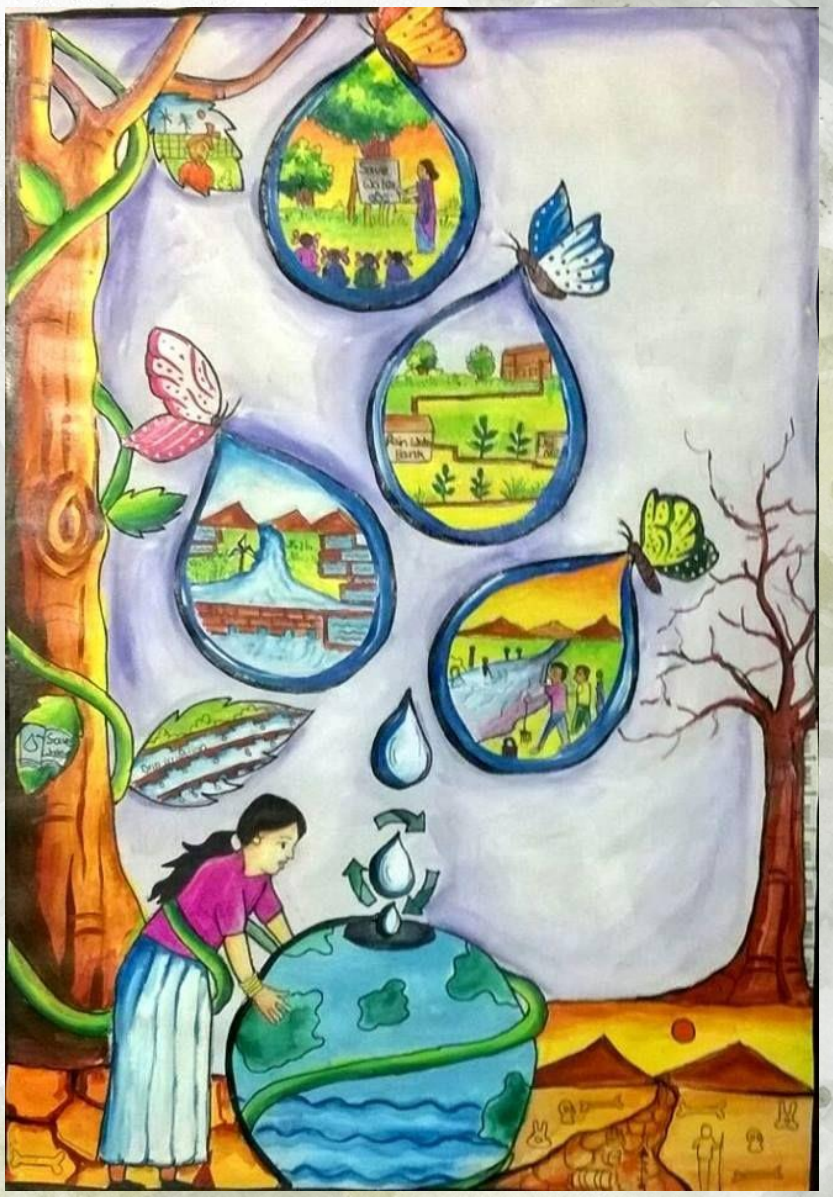
*Drought tolerant **GM corn** reduced transpiration by **17.5%** under stress conditions, allows **better moisture retention** to endure drought conditions **without additional irrigation.**

*Applied to **rice production**, that's an estimated increase of **118 million metric tons** of rice **19 times heavier** than the pyramid of **Giza!**





***A**frica is developing **GM drought tolerant** & **insect resistant maize** for smallholder farmers in sub **Saharan Africa.**



Worshipping Aphrodite for
her water preservation in ancient time.

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THANKS!

Any questions?