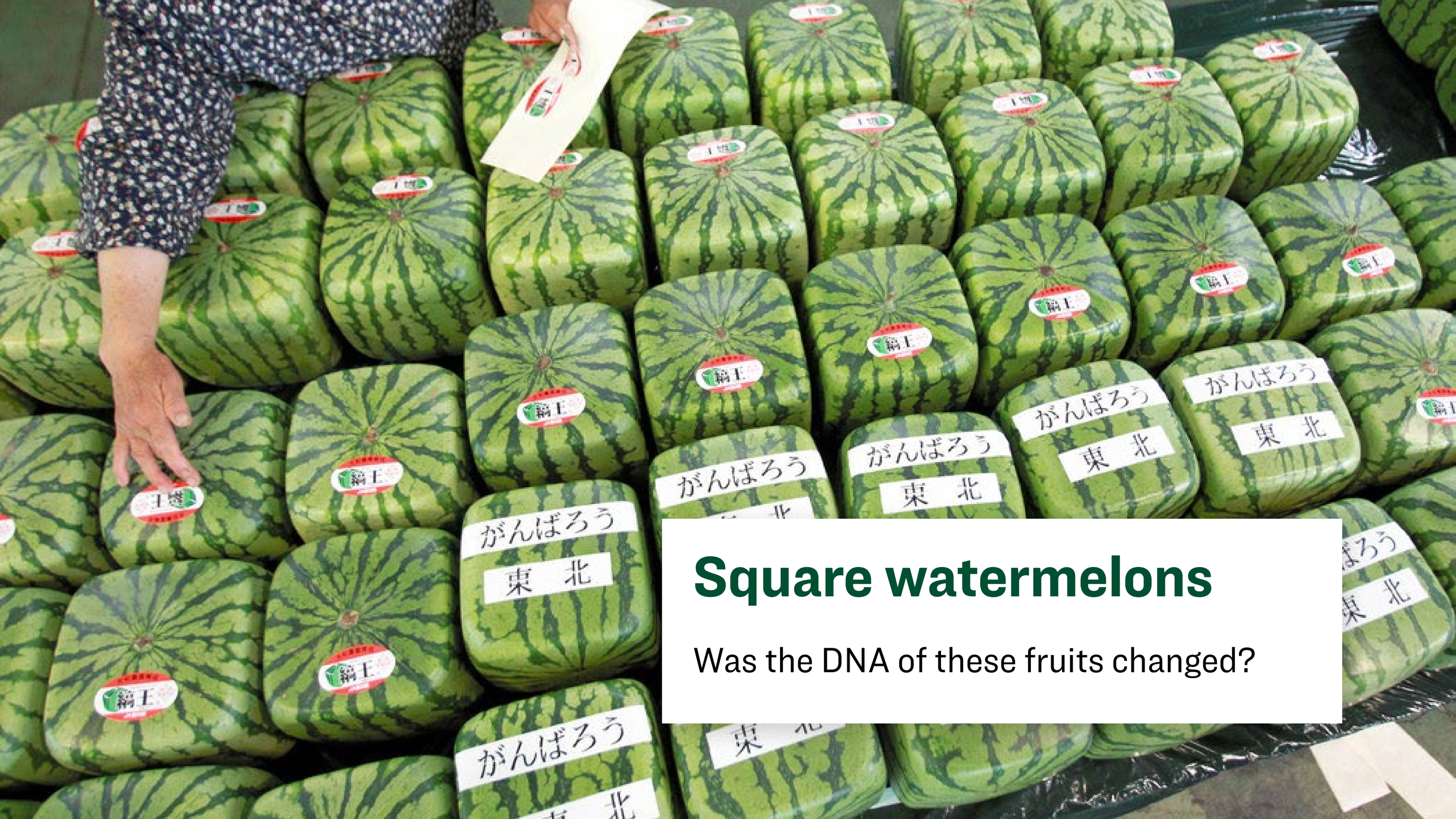
What do you know about GMOs?

CARD SORT

GROW
NEXT GEN



Square watermelons

Was the DNA of these fruits changed?

NO
Square watermelons are *not* GMOs

Square watermelons are not GMOs. They are created by growing watermelons in square containers.

https://nytimes.com/interactive/2016/07/12/science/gmo-misconceptions.html

Pineberries

What is a hybrid? Is it a GMO?

NO
Pineberries are *not* GMOs

Pineberries are not a GMO. They are a cross between a variety of strawberries from Chile and a variety of strawberries from North America. They are NOT a cross of a pineapple and a strawberry.

https://starkbros.com/growing-guide/article/all-about-pineberry

https://nytimes.com/interactive/2016/07/12/science/gmo-misconceptions.html

Rio Red grapefruit

How were the genes changed to create this fruit? Were genes moved from one organism to another or were the genes manipulated in another way?

NO
Rio Red grapefruit is *not* a GMO

The popular red grapefruit now grown in Texas (Rio Red) is the descendant of one of thousands of mutants produced by a breeder in the mid-1960s by bombarding pink grapefruit tree buds with radiation, a technique for accelerating evolution that has yielded new varieties in dozens of crops, including barley and rice. The crops created through that method, called mutagenesis or radiation breeding, can be certified as organic.

https://en.wikipedia.org/wiki/Grapefruit

Arctic apple

How might we keep apples from browning?

YES

Arctic apples *are* GMOs

https://okspecialtyfruits.com/arctic-apples-help-show-fruits-true-quality/

https://arcticapples.com/how-did-we-make-nonbrowning-apple/

The four genes that control enzymatic browning were silenced. This means that the enzyme that causes fruit to brown is not expressed. Enzymatic browning (aka primary browning) occurs when an apple's cells are damaged, such as through cutting, bruising or biting the fruit.

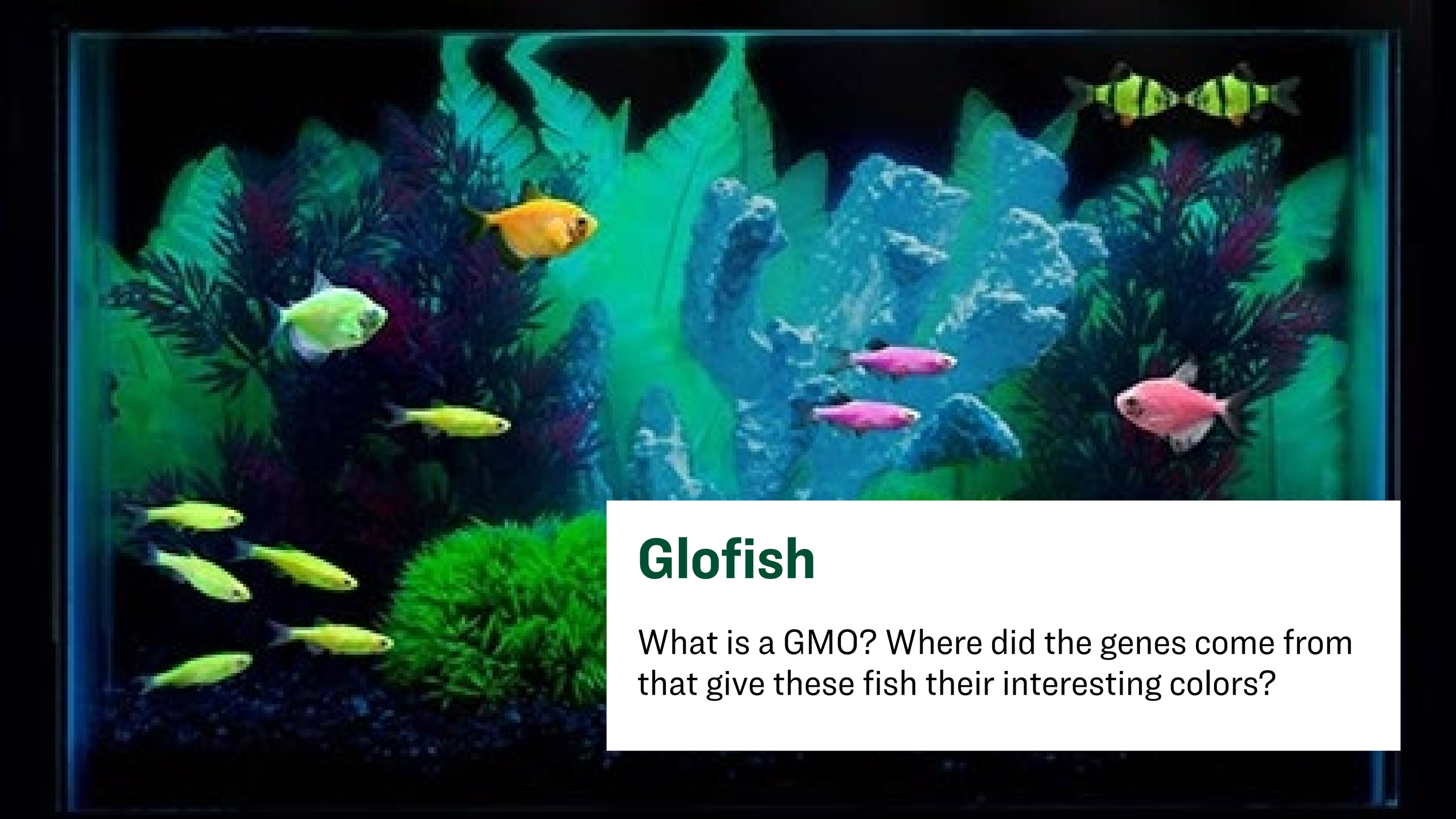
Humulin

What term on the product’s box can help determine how the product was made?

YES
Humulin is a GMO

http://americanhistory.si.edu/collections/search/object/nmah_1000967

Humulin is human insulin used for treating diabetes. Prior to its development, diabetics used insulin isolated from pig and cow pancreases. Developed by Genentech, the first American biotechnology company, Humulin was licensed to Eli Lilly and became the first marketable product created through recombinant DNA technology. Its licensing by the FDA in October 1982 also made it the first recombinant pharmaceutical approved for use in the United States.



Glofish

What is a GMO? Where did the genes come from that give these fish their interesting colors?

YES
Glofish are GMOs

Scientists in Singapore were the first to genetically modify fish to fluoresce. The long-term goal for the scientists was to detect toxins in water so that polluted waterways could be identified and the local communities using those waterways could be protected.

“The first step was to make them fluoresce all the time,” explains Alan Blake, co-founder and CEO of Texas-based Yorktown Technologies, which introduced GloFish to the home aquarium market in 2003. “The eventual goal was that they would selectively fluoresce in the presence of toxins,” he said.

https://petmd.com/fish/what-are-glofish

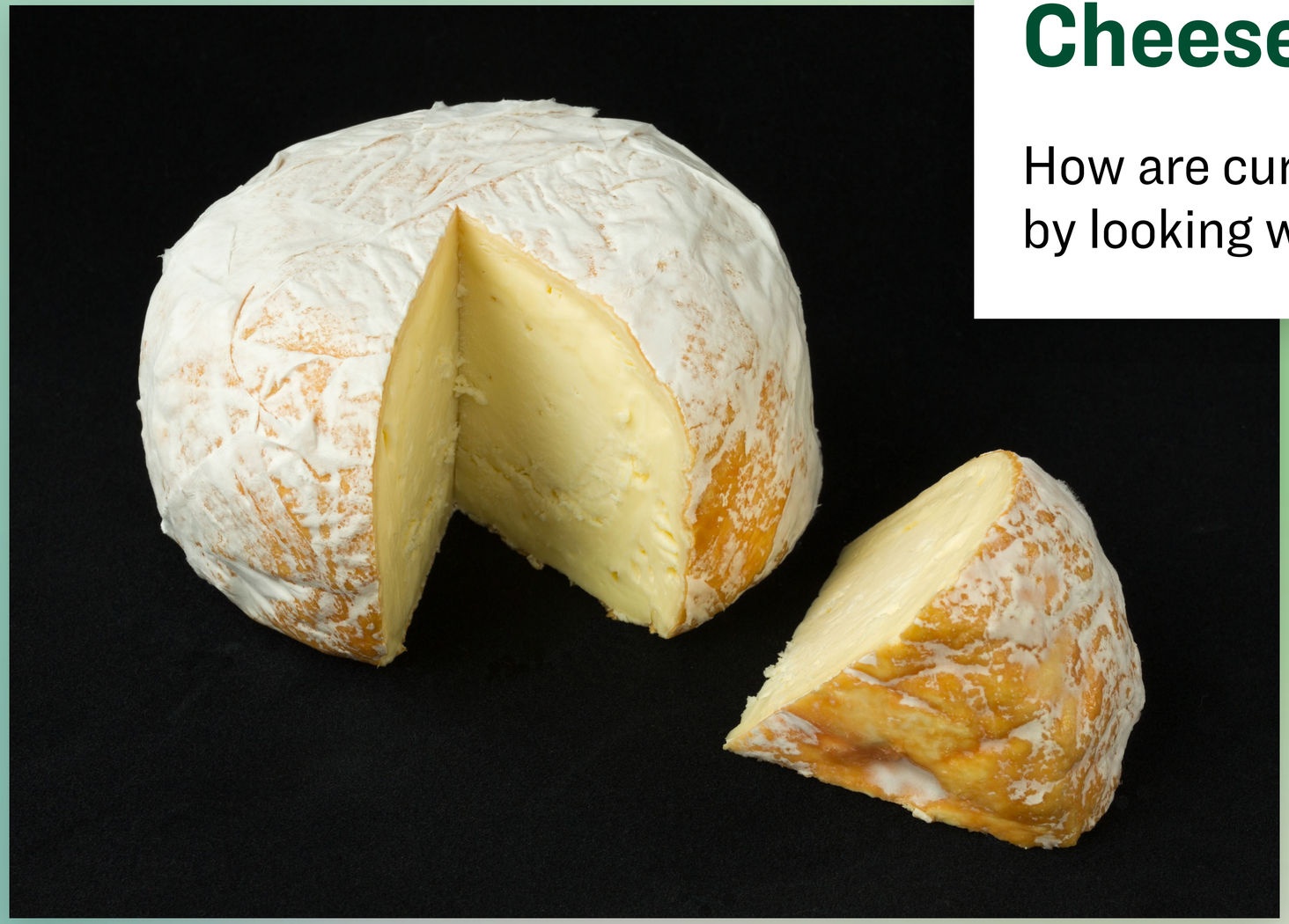
Dent (field) corn

Is genotype visible? Is phenotype always visible?

MAYBE

Corn may or may not be a GMO

Corn may be genetically modified to improve resistance to disease, insects, or herbicides. However, non GMO corn is also available. It is impossible to tell the difference based solely on appearance.



Cheese

How are curds formed? Can you tell by looking what process was used?

MAYBE

Cheese may or may not be made with GMO chymosin

https://en.wikipedia.org/wiki/Cheese#/media/File:Mozzarella_cheese.jpg

Most cheese is produced using chymosin produced by genetically engineered bacteria or fungi. Chymosin is the enzyme that makes the cheese form curds

Soybeans

Does most mean all?

MAYBE

Most soybeans in the United States are genetically modified, but they don’t look any different than non-GMO beans

Most soybeans in the United States are genetically modified, but they do not look any different than non-GMO beans. Soybeans are modified for traits like insect and herbicide resistance and improved nutritional profile, like high oleic.

Rainbow papaya

How might we create a disease-resistant variety?

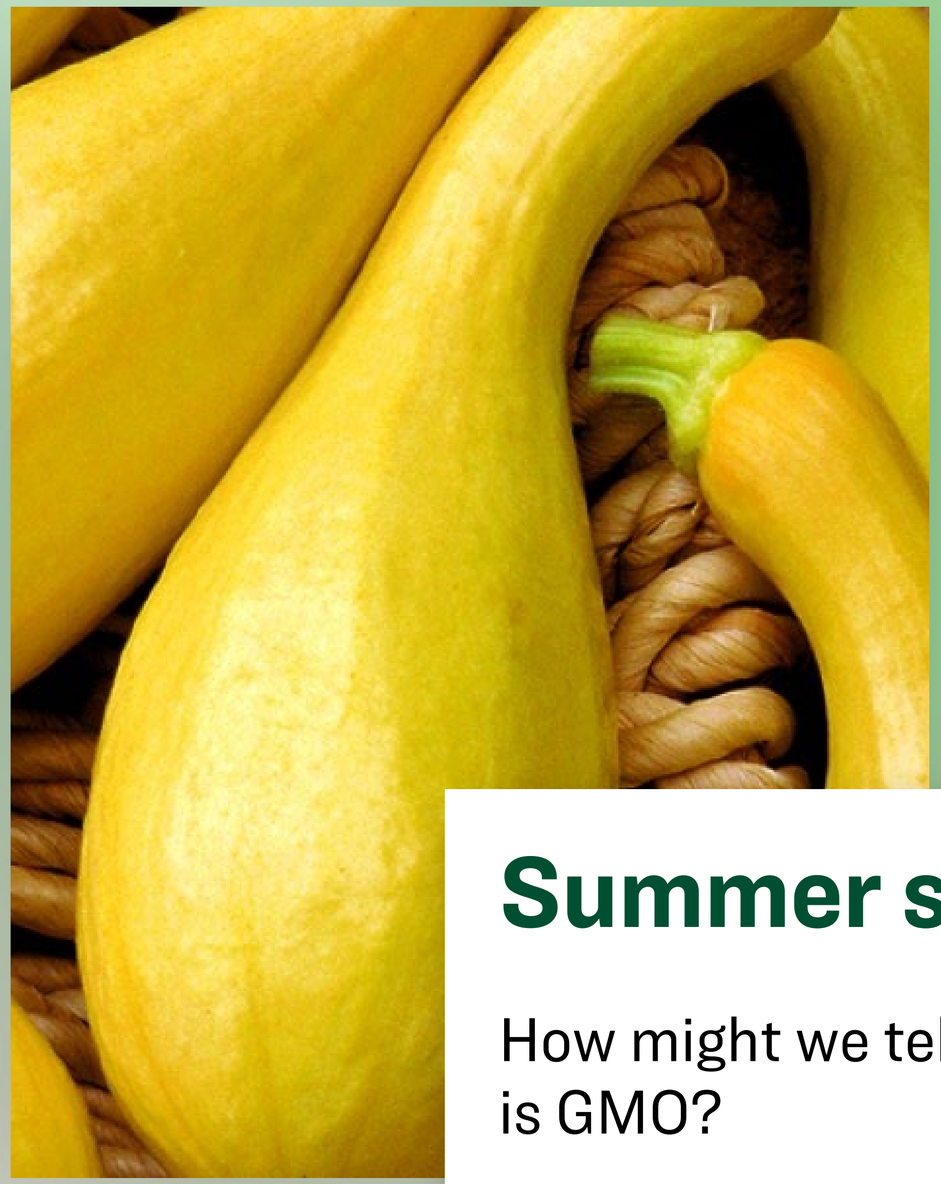
YES

Rainbow Papaya *is* a GMO

The Hawaiian papaya industry was nearly wiped out by the Ringspot Virus. Modern biotechnology techniques harnessed natural resistance in certain varieties to create papaya that is resistant to this virus. Today, most Hawaiian papaya is genetically modified, while all Rainbow Papaya are.

https://.hawaii.edu/~doisteph/Papaya/rainbow.html

https://scholarworks.iupui.edu/bitstream/handle/1805/813/GE%20plant%20virus%20resistance.pdf



Summer squash

How might we tell if zucchini is GMO?

MAYBE

Summer squash may or may not be GMO

A few varieties of summer squash (which includes zucchini) have been approved for virus resistance. It is probably still more common to see non-gmo varieties in grocery stores. However, it is not possible to tell by appearance which varieties are which.

https://foodinsight.org/genetically-modified-organisms-and-our-food-supply/

https://gmoanswers.com/ask/how-do-i-tell-if-zucchini-and-yellow-squash-seeds-are-gmo-or-not

Alfalfa

Can you tell if a crop is GMO or not by looking at it?

MAYBE

Alfalfa may or may not be GMO

Herbicide-resistant alfalfa is available, but not all farmers grow it. Alfalfa is primarily grown as animal feed. It is cut, dried, and baled in the field and is the fourth largest crop in the United States. However, currently, most alfalfa in the United States is non-GMO.

https://geneticliteracyproject.org/2016/12/05/gmo-alfalfa-has-higher-yields-than-conventional-according-to-usda-survey/

Cotton

Does most mean all?

MAYBE

Cotton may or may not be GMO

Most cotton in the United States is GMO, but some cotton is non-GMO. Cotton is genetically modified to offer the plant protection against bollworm (insect resistance) and also to be resistant to certain herbicides.

https://geneticliteracyproject.org/2018/08/29/white-gold-gmo-cotton-renews-hope-for-nigerias-troubled-textile-industry/

Belgian Blue cattle

What is a GMO? What is different about this breed’s genes?

NO

Belgian Blues are *not* GMO. They have been developed through selection of cattle with a natural mutation.

Belgian Blues have a natural mutation in the gene that codes for myostatin. Myostatin inhibits muscle development. Since the gene does not code correctly, myostatin production is disrupted resulting in increased lean muscle growth.

https://en.wikipedia.org/wiki/Belgian_Blue

Sugar beets

Does most mean all?
Can you always see phenotype?

MAYBE

Almost all sugar beets are GMO, but a small percentage are not. However, it is impossible to tell by appearance which is which.

Sugar beets are grown for their root, which contains about 18% sucrose. This is the same sugar found in sugar cane. In the United States, 95% of sugar beets are genetically engineered for herbicide tolerance.

https://en.wikipedia.org/wiki/Genetically_modified_sugar_beet

Seedless watermelon

How might we produce a seedless fruit?

NO
Seedless watermelon is *not* GMO

Seedless watermelon are produced without the addition of foreign DNA.
“Seedless watermelons are grown from seeds that are produced by crossing watermelon lines to produce plants that have an odd number of chromosomes,” according to Clemson University horticulture professor Jeff Adelberg.
“Because of the odd number of chromosomes, these plants are sterile and do not produce mature seed.”

https://news.clemson.edu/clemson-researcher-seedless-watermelons-come-from-seeds/

Canola

Was canola developed using genetic engineering?

MAYBE

Some canola has been modified to be herbicide resistant

Canola was developed using traditional plant breeding techniques, so it was not developed using biotechnology. However, about 80% of the canola grown in Canada has now been modified using biotechnology to make it tolerant to some herbicides. Using these specific herbicides has reduced the amount of chemical needed for weed control in the fields.

https://danielstrading.com/2014/02/26/market-spotlight-canola

https://canolacouncil.org/oil-and-meal/canola-oil/canola-the-myths-debunked/#GeneticEngineering

White russet potatoes

Why might we modify potatoes?

MAYBE

White russet potatoes may or may not be GMO

Currently, most U.S. potatoes are NOT GMO, even though several types have been approved.

https://medium.com/@gmoanswers/everything-potato-lover-needs-to-know-gm-potato-d5447374d841

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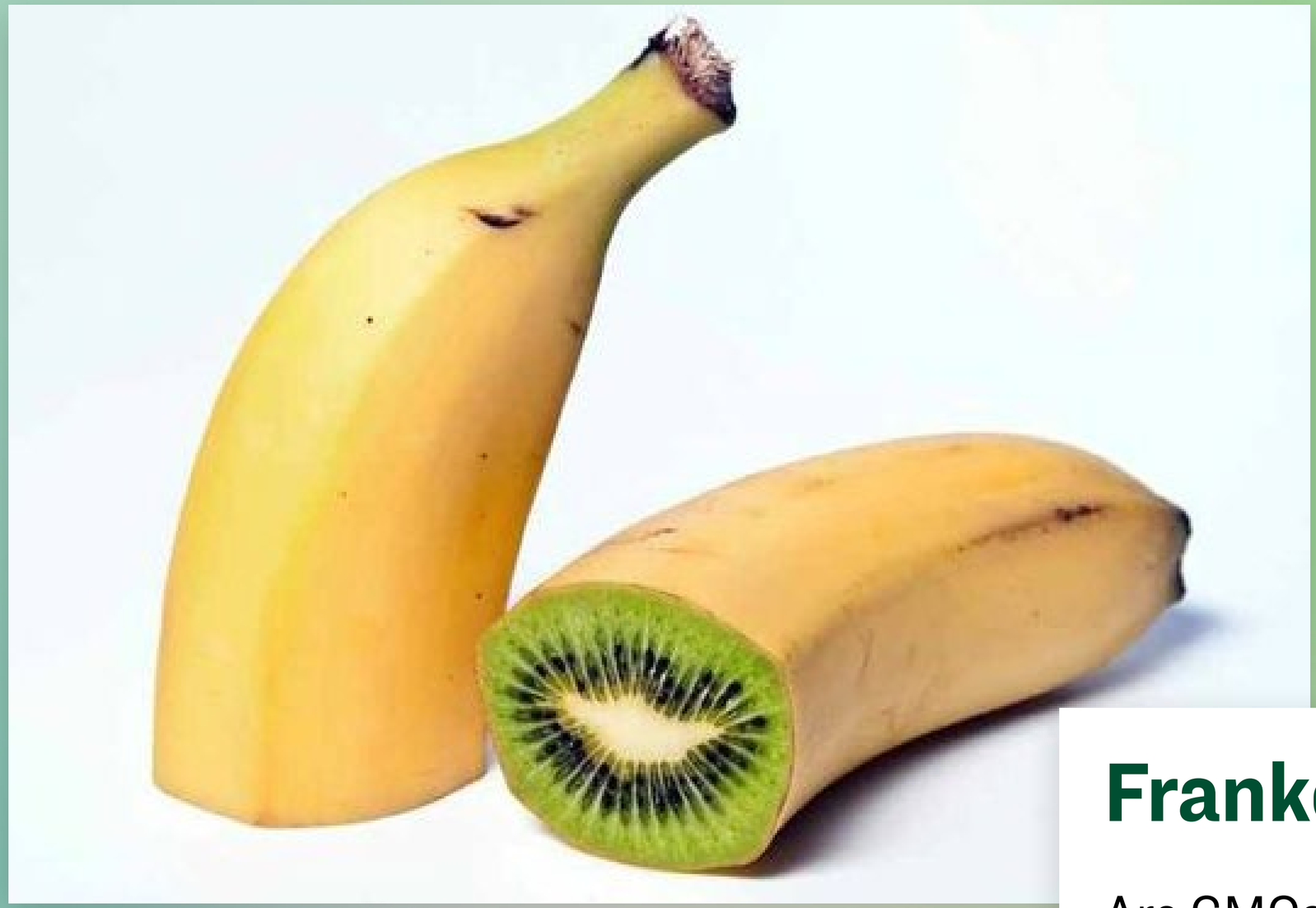

Frankenfood

Are GMOs real? Is this fruit real?

NO
Frankenfoods like this do *not* exist

Current technology is only able to “stack” less than a dozen genes in a single organism. In order to create a fruit like this, thousands of genes would have to be moved. Typically, GMO and non-GMO versions of crops or foods are difficult or impossible to differentiate by appearance alone.

https://treehugger.com/banana-kiwi-real-4868724

Find more great
resources like this at

grownextgen.org