



# LINKS TO AGRICULTURE



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## Genetics



Genes naturally occur in plants and are transferred from one plant to another through cross pollination. Through biotechnology plants are being developed that have genes artificially inserted in them by a scientist. A genetic engineer might place a combination of genes into a plant to make it more **useful** or **productive**. A scientist might try to create a tomato plant that provides more tomatoes; or she may try to make a plant resistant to a pest like a worm or a beetle. Some scientists work to make plants more tolerant to heat or cold or drought. This work is often a long and difficult process which takes patience and persistence. All foods that are genetically modified are put through the same safety and approval processes by the FDA as traditionally bred plants. Only those deemed as safe and nutritious as traditional plants are approved to be grown and eaten.

### Tomatoes



Tomatoes are one of the world's most popular vegetables and they contain a special nutrient called *lycopene*, which may reduce the risk of cancer and heart disease. Because of the health benefits of lycopene, scientists are now looking for ways to increase the *lycopene* in tomatoes. Scientists have also looked for ways to slow the ripening of a tomato so that the tomatoes can stay on the vine longer. Staying on the vine would improve their flavor.

At other times, scientists have tried to make tomatoes that would ripen all at one time. This would help farmers that sell their entire crop to a producer for sauce or ketchup because they would only have to harvest their field one time. But, if you had those same tomato plants in your back yard, it would be awful if they all ripened at the same time. You would only have tomatoes to eat for one week not for several months.

### Golden Rice

Millions of people in the world eat rice as their staple food. Many of these people often suffer from *Vitamin A* deficiency. When a person doesn't get enough *Vitamin A*, it can affect their vision and cause other medical problems. Scientists are looking into ways to insert genes into rice which may produce a kind of rice that contains more nutrients and would help improve the health of people that eat rice as the main part of their diet.



### Coffee and Tea

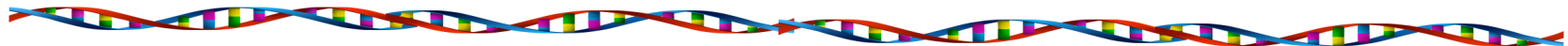


Other scientists are working to produce coffee beans and tea leaves that would provide naturally decaffeinated products. A scientist in Hawaii is developing a method for making all coffee beans ripen at one time so that harvesters could pick all the beans at the same time. This would save time and money for the farmer.

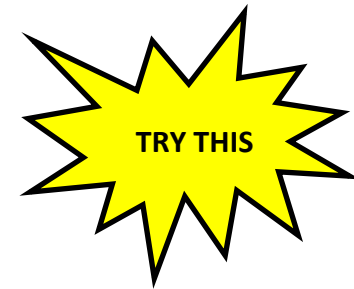


### What Does the Future Hold?

Scientists will continue to work hard to develop seeds for foods that are healthy for you and can be shipped without spoiling. They will also look for ways to adapt plants so they can grow in new environments. Scientists will try to reduce the need for pesticides by discovering ways to make plants insect resistant. What will happen in the future? We will have to wait and see.



# You Are Unique

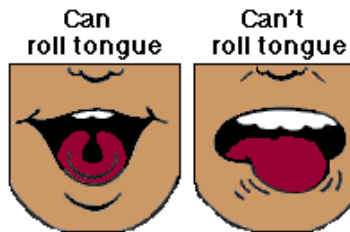


## Directions:

1. Complete the questions below with 2 other family members.
2. Write yes or no under each question.
3. Compare your results with your classmates.

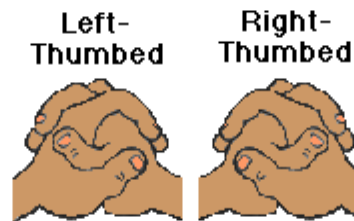
1. Can you roll your tongue?  
Stick out your tongue.  
Try to curl it into a "u."

-----  
You \_\_\_\_\_  
Person 1 \_\_\_\_\_  
Person 2 \_\_\_\_\_



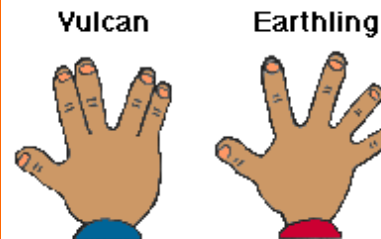
2. Put your hands together,  
interlocking your fingers.  
Which thumb is on top?  
Write "right" or "left."

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You \_\_\_\_\_  
Person 1 \_\_\_\_\_  
Person 2 \_\_\_\_\_



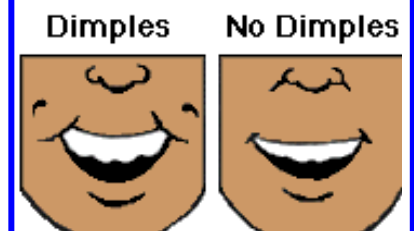
3. Can you make a Vulcan  
hand sign? Try to spread  
your fingers into a "v."

-----  
You \_\_\_\_\_  
Person 1 \_\_\_\_\_  
Person 2 \_\_\_\_\_



4. Do you have dimples?  
Smile at a friend.  
Does he or she see any  
dimples?

-----  
You \_\_\_\_\_  
Person 1 \_\_\_\_\_  
Person 2 \_\_\_\_\_



## Reflections:

- Is anyone else here just like you? Every person you know, or ever will know, is unique. No two people are completely alike (not even identical twins).
- Many of our traits or characteristics are "inherited" or passed down to us from our parents.
- See if your parents have the same traits. If you have a trait, then usually at least one of your parents will, too!

# Career Corner



**Genetic Engineer** - Genetic Engineers create changes in an organism's DNA using enzymes and current technology to their advantage. Because of this career, we are able to harvest crops that are resistant to different ailments like drought or pests.

### How Genetic Engineers Benefit Agriculture:

- Norman Borlaug and the Green Revolution
- GMO's are widely used today

### Genetic Engineers Study:

- Genetics
- Biology



SCAN ME



## What Did You Learn?

1. What was the author's purpose in writing this article? Circle any that apply. Be ready to prove your answer.
  - a. to make you laugh
  - b. to make you eat more rice
  - c. to inform you
2. Who would benefit by having all tomatoes ripen at the same time? Why?
3. Who would **not** benefit by having all tomatoes ripen at the same time? Why?
4. According to the article, circle any things that genetic engineers might be trying to do:
  - a. make plants in drought conditions
  - b. make coffee beans that are naturally decaffeinated
  - c. make plants more productive or useful
  - d. increase lycopene in tomatoes
5. What change in a food that is grown would you ask a scientist to make? How would this be helpful?

## Thank you to our major sponsors

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## Farm Facts

- Genetically engineered (GE) seed varieties were commercially introduced in 1996.
- In 2018, over 90% of the corn, cotton, and soybean crops grown in the United States were produced using GE varieties.
- In 2020, More than 70 countries from all over the world either planted or imported genetically engineered crops.
- Most of the genetically engineered crops grown in the United States are used for animal food.



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