Science Time

Program Content for November 23, 2016

Read the article “New weapon against hunger? Gates study boosts crop yields” on page A1 of the Friday, November 18, 2016 edition of The Seattle Times.

Objective/s

- I can explain how genetic engineering was used to increase photosynthesis in tobacco plants.

Next Generation Science Standards (NGSS) connection

- *Cross cutting concepts:*
  - The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time.
  - New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.

Pre-reading and Vocabulary: Define each term and then use it in a sentence to demonstrate your understanding.

1. photosynthesis
2. genetic engineering
3. agriculture
4. carbohydrate

Comprehension Questions

1. What did researchers a decade ago suggest could improve the food supply?
2. Why did the Bill and Melinda Gates Foundation decide to support the photosynthesis idea while others in scientific circles were skeptical?
3. What process did scientists used to alter photosynthesis?
4. What were the results of the photosynthesis alteration experiments?
5. Why are the results achieved impressive?
6. What are the next steps for scientists in this line of research?
7. Why might some groups oppose further research and spread of the genetic engineering research you described above?
8. What type of people would stand to benefit the most from an increase in photosynthesis productivity of 40 - 50%?
9. What did the original Green Revolution accomplish?
10. Why was the tobacco plant chosen as the plant of study in the genetic engineering experiments?
11. Describe the initial methods used by scientists during their study.
12. Why was the beginning step you described above completed?
13. What typically happens when plants receive more direct sunlight than they can use?
14. How did the genetic engineering changes introduced by scientists alter the process you described above?
15. Which food crops do researcher plan to test next using the same genetic engineering techniques?

Prompts and Extensions

Science Time is posted to the Web on Wednesdays. Please share this NIE Science Time program with other teachers. To sign-up for the electronic edition for your class, please register

1. Take a look at the researcher's recently published article in Science and a great accompanying video about the study.
2. Watch these two video clips. First about the original Green Revolution (and its founder) as well as what may soon be the second Green Revolution. How do the techniques used during these two "Revolutions" compare and contrast?
3. Learn more about how genetically modified crops are created and the ethical debate surrounding their use by exploring this website.
4. As stated in the article there are some groups that are against genetic engineering. Based on your understanding of the process and from what you read in the article do you think genetic engineering is a worthwhile scientific pursuit? Why or why not?
5. See the Science Time from November 2nd for an article on the analysis of genetically engineered crops in comparison to those that are grown conventionally.