



Grade 5-6 Environmental Benefits of Plant Biotechnology

National Science Standard

Personal and Social Perspectives: Science and technology in local challenges

Objectives

The student will

1. identify the environmental benefits biotechnology has to offer

Background

Plant biotechnology enables farmers to conserve natural resources.

1. Promotes Land Conservation:

- Biotech crops allows for higher yields on less land. Improved farm productivity would result in less impact on prairies, wetland and forests that wildlife habitats depend upon.
- Biotechnology can help produce plants that grow in extreme heat, dry or poor soil, thus making use of land that may have been considered unfit for farming.

2. Decreases soil erosion:

Some biotech crops require less tilling helping to preserve precious topsoil and reduce farm run-off into streams and rivers. (improved water quality) Biotech crops allowing farmers to leave their fields untouched which leaves more plant residue on the ground to replenish nutrients and hold topsoil in place.

3. Decreases fuel use:

Biotech crops require fewer pesticide applications resulting in fewer trips across the field with fuel-powered equipment.

4. Improve Air Quality

The use of no-till farming practices reduces the release of greenhouse gas emissions, which may help slow global warming. (In contrast, when cultivated soil is exposed to air, organic matter is oxidized, releasing carbon dioxide--an ozone depleting gas--into the atmosphere.

5. **Improves wildlife diversity:** Biotech cotton has been documented to have a positive effect on the number and diversity of beneficial insects in US cotton fields. In addition, the use of no-till farming methods creates wildlife habitat for birds and other wildlife.

Biotechnology develops disease-resistant plants that reduce the need for pesticides.

1. Biotechnology is helping to make hardier strains of staple crops such as sweet potato, cassava, papaya, rice and corn that provide better protection against insects and disease.

- For example, researchers are developing sweet potatoes that are resistant to the sweet potato feathery mottle virus, which can destroy between 20 to 80 percent of a sweet potato crop.

Biotechnology helps to develop enriched food:

1. Biotech has been used to enrich Cassava, a staple in many poorer regions of the world, to contain 35-45% more protein which promises to aid in multiple health problems of these regions.

Feeding the growing population

To preserve the environment, some argue for a simpler, organic style of farming. However, organic farming yields are much lower than yields using modern farming methods. 200,000 people are being added to the population every day. An additional 4 billion acres will need to be farmed by 2050 to feed all these people if there is no increase in farm productivity. That's more than twice the size of the continental United States. Biotechnology helps farmers grow more food while protecting their farmland from deteriorating—and prairies, forests and other natural areas from cultivation.

Word Power

- Biotechnology (n.): using scientific discoveries about living things to solve problems
- Genetically modified seed: seeds from plants that have been enhanced by inserting genes from another plant to achieve a plant with a desired trait.

Additional Resources:

- *Council for Biotechnology Information*, www.whybiotech.com
This web site has an excellent section for teachers and students.
Includes articles such as:
“Environmental Benefits: More Studies Show How Biotech Crops Help Wildlife, Environment”
“Resistance to New Foods Has Been the Norm”



Activity 1

Soybeans, corn, and cotton are the main biotech crops in America.

Crop	Number of acres grown in the United States	Percent of these crops that are biotech crops
Soybeans	72.7 million acres	85%
Corn	72.7 million acres	45%
Cotton	13.1 million acres	75%

Have the students list products (food or non-food) from each one of these major crops. Discuss what impact these products have in the student's daily lives. Discuss the likelihood that biotech crops were used in these products.



Activity 2

Have the student choose 5 benefits of biotech crops. Divide the class into groups of approximately 5 students each. Have them practice explaining these benefits to each other.

Outside the classroom, have the students survey 10 people about the use of biotech crops using the question below:

1. Do you think farmers should use seeds that have been genetically modified by scientists? (Putting a gene from one plant into another to give the new plant the desired trait.)

To each person who states NO, explain the benefits of genetically modified crops. Did their opinion change?

Person surveyed	YES	NO	Did their opinion change?

Discussion Questions:

How did knowledge about the benefits of biotech crops affect the person's opinion? Can you think of other products that people feared when first introduced? What helps people change their views about these products?