

UNIT VI - PLANT TECHNOLOGIES

Lesson 5: The Impact of Plant Biotechnology

Competency/Objective: Summarize the impact of biotechnology in plant agriculture.

Study Questions

1. **What are the career opportunities in plant biotechnology?**
2. **What are some economic factors of plant biotechnology that affect producers?**
3. **What are health and safety concerns of consumers of plant biotechnology?**
4. **What are the global social impacts of plant biotechnology?**

References

1. *Biotechnology: Applications in Agriculture (Student Reference)*. University of Missouri-Columbia: Instructional Materials Laboratory, 1998, Unit VI.
2. Activity Sheet
 - a) AS 5.1: Careers in Plant Biotechnology

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TEACHING PROCEDURES

A. Review

Plant biotechnology has many applications, not only for food, but for products such as biofuels and biopolymers, as discussed in the last lesson. Many of these products may be on the market soon. What will be the impact of these new products? Will they only be positive? This lesson will provide a look at the economic, health and safety, and social effects of biotechnology on the United States and the world.

B. Motivation

Ask students to imagine this headline "World Price of Sugar Drops to All-Time Low: New Sugar-Producing Tobacco Provides Bumper Crop." Discuss the global effects of this event.

C. Assignment

D. Supervised Study

E. Discussion

1. Ask students to recall the career areas discussed for animal biotechnology. Relate them to plant biotechnology, pointing out those careers specific to plant biotechnology.

What are career opportunities in plant biotechnology?

- a) General areas of biotechnology career opportunities
 - 1) Research and development
 - 2) Quality control
 - 3) Clinical research
 - 4) Manufacturing and production
 - 5) Regulatory affairs
 - 6) Information systems
 - 7) Marketing and sales
 - 8) Administration
 - b) Career opportunities specific to plant biotechnology
 - 1) Plant scientist
 - 2) Greenhouse manager
 - 3) Tissue culture technician
2. Ask students to list the benefits and risks of producing a genetically modified crop.

What are some economic factors of plant biotechnology that affect producers?

- a) Benefits
 - 1) Lower input costs for crops that require less chemicals
 - 2) Premium price for specialized crops
- b) Drawbacks
 - 1) Higher price of seed
 - 2) Higher costs associated with the special handling needed to keep crops with a modified composition separate from unmodified crops

- 3) Limited market for specialized crops
3. Ask students to recall the results of the survey done in Unit 2. Have students list any concerns raised by those who were surveyed.

What are health and safety concerns of consumers of plant biotechnology?

- a) Questions about the healthiness of genetically modified foods arise about foods in which the composition of the plant is changed.
 - b) Some consumers also worry that a plant altered for an industrial purpose will wind up in the food supply.
4. Ask students to speculate about the effect on other countries if a transgenic crop is introduced in the United States. Ask students if the effect would be positive or negative.

What are the global social impacts of plant biotechnology?

- a) Positive global impacts
 - 1) Transgenic plants, such as the sweet potato resistant to the feathery mottle virus (FMV), can greatly benefit developing countries.
 - 2) The development of environmentally tolerant plants could help reduce the risk of famine in some countries.
 - 3) The development of edible plant vaccines could make it possible for millions of poor people to receive vaccines.
- b) Negative global impacts - The development of some genetically modified crops can destroy the profitability of agricultural cash crops that may be vital to a country's economy.

F. Other Activities

Have students give presentations on the possible social impacts of the introduction of a new transgenic plant.

G. Conclusion

Transgenic crops are just beginning to be planted by producers, and therefore the full impact of these new crops is not quite clear. What transgenic plants will be introduced in the next five to ten years? What will be the long-term impact of the transgenic crops already in commercial production? Will producers, consumers, and developing countries be positively or negatively affected by plant biotechnology? These questions are difficult to answer, but they must be addressed to avoid social and economic pitfalls.

H. Answers to the Activity Sheet

AS 5.1

Answers will vary.

I. Answers to the Evaluation

1. a
2. d

3. Students may list either of the following: the healthiness of genetically modified foods in which the composition of the plant is changed or that a plant altered for an industrial purpose will wind up in the food supply.

4. Reduced input costs for crops that require less chemicals and a premium price for specialized crops
5. Plant scientist, greenhouse manager, tissue culture technician

6. Where can this education be obtained?

7. What is the future job market outlook like for this position?