

Name: _____ Hour: _____ Date: _____

4.5 Student Handout

A. Phenomenon—Define the Problem. As you watch the video ("[Will Bananas go extinct?](#)"), answer the following questions:

1. Why could Cavendish bananas be killed in a short period of time (what is the problem)?

1 Point 0 Points

Answer contains each of the following components:

- ☐ The Cavendish bananas are clones (i.e., do not have genetic differences between the population)
- ☐ The Panama Fungus can adapt to kill the Cavendish.

2. Why was the Gros Michel killed off previously?

1 Point 0 Points

Answer contains each of the following components:

- ☐ The answer should recognize that the process that killed the Gros Michel is the same one that may kill the Cavendish.

3. How have bananas been treated against fungal diseases?

1 Point 0 Points

Answer contains each of the following components:

- ☐ Answers may vary but should include responses such as fungicides, genetic modification, etc.

4. After the video, what are two additional questions you have or two things you wonder?

A.

B.

2 Points 1 Point 0 Points

Answer contains each of the following components:

- ☐ 2 original questions created as an individual or group.

After Video Questions (cause and effect):

1. How can the TR4 fungus (Tropical race 4) disease attack the new Cavendish banana in a way that the banana cannot adapt to?

2 Points 1 Point 0 Points

Answer contains each of the following components:



- ☐ The student recognizes that the Cavendish are clones that do not change.
- ☐ The student recognizes that the fungus undergoes sexual reproduction and that its genetic makeup changes through generations according to natural selection.

2. Without researching, what are some solutions you can think of that would help fight the fungus affecting the survival of the Cavendish banana species?

1 Point 0 Points

Answer contains each of the following components:

- ☐ The student has made a list of 2-3 possible solutions to help the Cavendish banana species. They do not have to be fully logical yet (e.g., simply having them reproduce).

3. What are some unintended consequences of your ideas to help the bananas survive?

1 Point 0 Points

Answer contains each of the following components:

- ☐ Student identifies at least 1 unintended consequence of their proposed solution(s) in question 2.

B. Potential Solutions “What would the best solution to this problem look like?”

Criteria (what we want to happen)	Constraints (what barriers are in the way?)

C. Do Background Research

1. Your teacher will provide you with access to articles that describe methods biologists have tried to help bananas survive. Some criteria and constraints have been selected and listed as the titles of each column. After reading the articles, fill out each box in the table to indicate how well each method meets the criteria or constraints, and then share your table with your group.

	Who should pay for this solution? Why?	Is this a long-term solution ? Why?	Does this solution cause any ethical problems (hurts the environment, humans, etc.)? Why?	What other problems could occur? Is this solution doable? Why?
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Transgenics				
Fungicides				
Bio-Control				
Artificial Selection (Breed a new type of banana)				

5 Points 2.5 Points 0 Points

☐ Tables are filled out according to directions.

D. After Research Questions

1. Based on what you have learned, what do you think is the best way for the banana plant to resist the TR4 fungus? Note: Different students may reach different conclusions on this question.

1 Point 0 Points

Answer contains each of the following components:

- ☐ The student uses evidence from the table and from talking with their group to propose what they believe is the best solution. (There is no right or wrong answer here, as long as they provide evidence.)
- 2. Why do you feel the solution you chose is the best option? (Is it the best solution according to the criteria in section B above?)

1 Point 0 Points

Answer contains each of the following components:

- ☐ The student uses evidence from the table and from talking with their group to propose what they believe is the best solution. (There is no right or wrong answer here, as long as they provide evidence.)



3. Would this solution work for all species facing similar threats? Why or why not?

1 Point	0 Points
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Answer contains each of the following components:

- ☐ The student recognizes that each case is unique and may require a different solution based on the type of plant and fungus present.

4. What are the possible unintended consequences of your chosen solution (does it cause any unintended effects)?

1 Point	0 Points
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Answer contains each of the following components:

- ☐ The student uses logical and creative thinking to answer the question.

Expert	Proficient	Emerging Proficient	Below Proficient
This student has shown proficiency with the entirety of the lesson, and high-rigor extensions below are recommended.	This student has shown proficiency in this standard, and extensions below this lesson are recommended with aid.	This student needs more practice to show proficiency in this standard.	This student needs substantial practice to become proficient in this standard; intervention is recommended.
18-16 Points	15-12 Points	11-9 Points	9-0 Points