

Climate Change and the Future of Michigan Cherries:
- Lesson 3 Worksheet & Homework -

Scientific models and discussion:

1. What is a scientific model?
A representation of part of the real world.
Created by combining real data from many variables to estimate processes and systems over time.
2. Why are scientific models useful?
Student answers may vary. Students may something like, "they make a lot of data/a complex relationship easier to visualize and understand."
3. Strengths & limitations of our model:

Strengths	Limitations
Makes complicated dynamics easier to understand	Extrapolations, Variability
Relatively accurate/strong power to predict	Generalizability (other species, regions)
Helps us plan or take action	Doesn't include frost data
Student answers may vary	Student answers may vary

4. What other information or data could we collect to make it even more useful to us? (Describe at least two. Hint: address the limitations described above)
Student answers may vary. Collecting more data (over a longer period of time, or from more cherry trees) can help make our model more accurate. Measure the variability (margin of error). Etc.
5. How did your model and line of best fit change when you added data from 2012, 2013, and 2015? How might your model change in the future?
The slope increased/ became slightly steeper; the y-intercept increased.
(Old equation: $-1.297x+173.217$ rounded to $-1.3x + 173.22$ / New equation: $-1.307x + 173.618$ rounded to $-1.31x + 173.62$)
Note: Students may note that these changes are very slight, but over time adding more data may further change the line of best fit/ predicted bloom dates.
6. How is Michigan's climate expected to change in the future? How might this impact Michigan cherry farmers and the larger population?
Michigan's average temperature is expected to increase which would cause cherry trees to bloom earlier. Student answers re. impact may vary: loss of crop due to frost or other events, expense of mitigation, increase in price of cherries, etc.

7. Describe two actions being taken to address the cherry tree issue.
Student answers may vary. They could use the two examples from the NPR talk: the fans used to move the warm air around the trees, and the misters.

8. What else are you left wondering about this real-world problem? What kind of other data might you want to gather in the future to help farmers better adapt to or prepare for these changes?

9. What can you do to contribute to climate research and climate change mitigation? Give at least one example of each.
Student answers may vary. Do One Thing, Cherry Blossom Blitz (Project Budburst), are examples of organizations they can help to make a positive change.

HOMEWORK

Homework 3 instructions: (Turn in separate document)

Explain to a cherry tree farmer (in a memo, letter, script for an in-person conversation, or other creative form) how phenology data could be helpful to them. Discuss:

- What the graphs tell us and how they can use phenology data to help them prepare
- What challenges Michigan cherry farmers might face in the future and why
- What other types of data would be helpful to the cherry farmer? (Think about what else happened in 2012 after the flowers bloomed. Why is frost data important?)

Also discuss: How farmers can mitigate these impacts. Discuss the technologies the radio story mentioned, as well as any other strategies you can find online. What do you recommend to the farmer? What are the costs and benefits of each option?

Get creative! For example, you could include quotes from a farmer or pictures to explain the events. Your article should include at least three paragraphs of clear writing.