

# Climate and Crop Growth Answer Key

1. Will corn grow equally well in each agricultural area around the world?  
**no**
2. Explain your answer.  
Different crops have different requirements for temperature and precipitation. The temperatures and precipitation levels aren't the same across all agricultural lands on Earth. Therefore, corn is unlikely to grow equally well in all agricultural areas around the world.
3. What are important resources to follow in this model?  
The important resources to follow in this model are topsoil, precipitation, and plant growth.
4. What processes are changing the availability of these resources in the model?  
Topsoil is affected by the slope of the land, precipitation, and plant growth. A bigger slope leads to more erosion, as does more precipitation. Plant growth can slow erosion of the topsoil. Precipitation is not changed by any other resource in the model; it is set by the sliders. Plant growth is affected by the amount of topsoil. When there is less topsoil, the plants do not grow as well. This can lead to more erosion of the topsoil.
5. Which factor(s) in the model determine how well wheat grows? (Select all that apply.)  
precipitation  
slope of the land
6. Explain how the factors you selected affect wheat growth.  
Wheat growth only happens during some months of the year; this could be related to temperature, but that's not clear from the output of the model. There is no temperature display from the model.  
Wheat growth is dependent on precipitation because wheat doesn't grow as much in the semiarid climate as it does in the tropical rainforest and humid continental climates. The slope of the land affects the amount of erosion, which affects the plants' growth. When there is less topsoil, there are fewer resources available to the plants, so they grow less well.
7. What do you think are the important resources to follow in this model?  
The important resources to follow in this model are topsoil, precipitation, and plant growth.

# Climate and Crop Growth Answer Key, continued

8. What processes are changing the availability of these resources in the model?  
Topsoil is affected by the slope of the land, precipitation, and plant growth. A bigger slope leads to more erosion, as does more precipitation. Plant growth can slow erosion of the topsoil. Precipitation is not changed by any other resource in the model; it is set by the sliders. Plant growth is affected by the amount of topsoil. When there is less topsoil, the plants do not grow as well. This can lead to more erosion of the topsoil.
9. Which precipitation level leads to good wheat growth?  
moderate precipitation
10. Explain why the precipitation level you chose leads to good wheat growth.  
When the precipitation level is less than 10 mm per month, the plants are very tiny. When the precipitation is above 450 mm per month, the plants are also very tiny. At in-between levels, the plants grow tall and strong. The plants aren't stressed for water or drowned in too much water at moderate precipitation amounts.
11. How certain are you about your claim based on your explanation?  
Student answers will vary.
12. Explain what influenced your certainty rating.  
Student answers will vary. Scientific evidence includes specific reference to experiments with the model. Students may express uncertainty with the model since it shows that wheat grows when there is no precipitation.
13. What is the minimum annual rainfall amount that corresponds to agriculturally suitable land?  
Agriculturally suitable land has a minimum average rainfall of  
725-1,475 mm
14. What is the minimum annual average temperature that corresponds to agriculturally suitable land? Agriculturally suitable land has a minimum average temperature of  
-4.5 to 5.5°C
15. Are crops more likely to grow better in India or in Australia?  
India
16. Explain your answer.  
India is more likely than Australia to be able to grow crops. Australia and India have very similar average temperatures, but India has much more precipitation than Australia. The agricultural suitability map also shows that India has more land that is suitable for agricultural purposes.

# Climate and Crop Growth Answer Key, continued

17. How certain are you about your claim based on your explanation?  
*Student answers will vary.*
18. Explain what influenced your certainty rating.  
*Student answers will vary. Scientific evidence includes specific reference to the temperature and precipitation maps, as well as the agricultural suitability map.*
19. Which event was most frequent over the time period measured in the graph?  
*about the same frequency of moderate to severe droughts and wet events*
20. What can farmers do to ensure that enough food will be produced to feed the population, even if the weather patterns do not cooperate?  
*Farmers can over-produce crops in times that are good to get through the times when the weather is not cooperative. Food can be stored for later use. If there are droughts, farmers can also irrigate their fields to ensure decent production.*