

Glade Temperature and Precipitation Graphing Lesson

OVERVIEW: It is suggested that abiotic factors such as temperature and precipitation help determine the distribution of plants. In the cedar glade, it is perhaps more exaggerated because of the harshness of the environment. In this lesson, we will consider precipitation as a primary factor in plant abundance.

GRADE LEVEL: 5 – 8

TIME: 1 class period

SETTING: Classroom

OBJECTIVES:

Students will create a basic graph and compare/contrast data.

Students will determine if the abiotic factor of precipitation affects the population of two selected glade plants, Gattinger's prairie clover (*Dalea gattingeri*) and Tennessee purple coneflower (*Echinacea tennesseensis*).

LEARNING STANDARDS CORRELATED: Science GLE 0707.3

QUESTION: What role does the seasonal distribution of precipitation play on abundance of Gattinger's prairie clover and Tennessee purple coneflower in hypothetical scenarios?

MATERIALS:

Paper and pencil

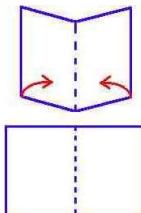
Graph paper

Student handouts (temperature and precipitation data; questions for discussion)

BACKGROUND: The scenarios given regarding the abundance of plants (Gattinger's prairie clover and Tennessee coneflower) are hypothetical while the precipitation data are actual records for Lebanon, Wilson County, Tennessee. To make a comparison between two data sets (temperature and precipitation) with two different plants, students will create a 'foldable' graph that will allow them to graph and examine the information side by side.

TEACHER INSTRUCTIONS TO STUDENT:

1. Orient your graph paper so the 8.5" ends are at the sides. Fold the paper into a hamburger fold, and then unfold flat.



2. Make a dark line along the fold, so that you evenly divide the paper into two halves. We are going to create two graphs side-by-side, one on each half of the paper.
3. Use the precipitation data for the y-axis on the left half of the paper, and the year for the x-axis.
4. Draw your bars for the precipitation data.
5. Use the plant data for the y-axis on the right half of the paper, and the year for the x-axis. Since there are 2 kinds of plants, you will have 2 (two) bars for each year. Draw them so they are adjacent to each other (with only a single row of graph squares between each pair of bars).
6. Draw your bars, and color those for the coneflower and prairie clover different colors. However, all the bars, across all the years, for each type of flower should be the same.
7. Use your graph to answer the questions.

JOURNALING: Invent your own data for another set of plants of the cedar glades. Imagine you are a traveling botanist and study this for a month. What do you infer after your experience? Write it up as a scientific entry.

DATA TABLE

for Precipitation and Plant Distribution Lesson

Month of May

Year	Total Rainfall* (inches)	Numbers of Plants*
1995	8	G= 116 C=42
1996	7	G= 106 C=78
1997	6	G= 100 C=84
1998	5.5	G= 80 C=100
1999	4	G= 70 C=120
2000	5	G= 76 C=112

* data rounded

*hypothetical data column

QUESTIONS for Discussion as a Class / Individual Student:

1. What plant seemed to flourish after sufficient rainfall? What plant was not as successful with increased rainfall? Why do you think this?
 2. When would conditions be most favorable for successful germination of the Gattinger's prairie clover? Why? Can you ever think of situations that might alter this hypothesis?
 3. When would conditions be most likely for successful germination of the Tennessee purple coneflower? Why? Can you ever think of situations that might alter this hypothesis?
 4. What other abiotic factors might alter this data? List these and how each may affect the plant.
 5. What biotic factors might affect the survival of each plant? List several and explain.

QUESTIONS (Teacher Copy):

These are just suggested answers!

- What plant seemed to flourish after sufficient rainfall? *Gattinger's prairie clover*
What plant was not as successful with increased rainfall? *Tennessee coneflower*

Why do you think this is?

Reasons may include...

- Coneflower may require drier conditions for germination
- Coneflower may not withstand added competition from other plants germinating if ample rainfall is present
- Any other reasonable suggestions from students

- When would conditions be most likely for favorable germination of the *Gattinger's prairie clover*?

During times of year that have the most precipitation

Why? Seems to be successful for the prairie clover one year, we can infer it would repeat another year

Can you ever think of situations that might alter this hypothesis?

*What if the rainfall pattern is best for a longer cycle involving more droughts alternating with rain to encourage hardier reproduction methods for survival
Temperature differences- cooler than average, for example*

- When would conditions be most likely for successful germination of the *Tennessee purple coneflower*? *Less rainfall* Why? *Its numbers were greater in these years* Can you ever think of situations that might alter this hypothesis?
*What if the rainfall pattern is best for a longer cycle involving more droughts alternating with rain to encourage hardier reproduction methods for survival?
Temperature differences- cooler than average, for example*

- What other abiotic factors might alter this data?

- Temperatures- accept any reasonable answers; a really cold spring may lessen the distribution or survival rate of plant*
- Severe Weather – such destruction of habitat by a severe storm*

- What biotic factors might affect the survival of each plant? List and explain.

- Severe insect damage*
- Invasion of exotic plant species*
- Introduction of non-native animal that may consume plant before reproductive cycle has a chance to go through cycle*

