Name _____ Date _____ Period _____

ZornScience
zornscience.org

Road Salt and Duckweed

Biology

Work with your group. Record every measurement with its unit. Answer questions in complete sentences.

Draft lab. This lab has not been tested in a classroom yet. Your teacher may change some steps, times or amounts.

The Puzzle

Every winter, salt spread on roads washes into streams and ponds. **Duckweed** is a tiny floating plant that grows by budding off new leaf-like **fronds**. Its population can double in a few days. How much salt can duckweed tolerate before its population stops growing?

Question

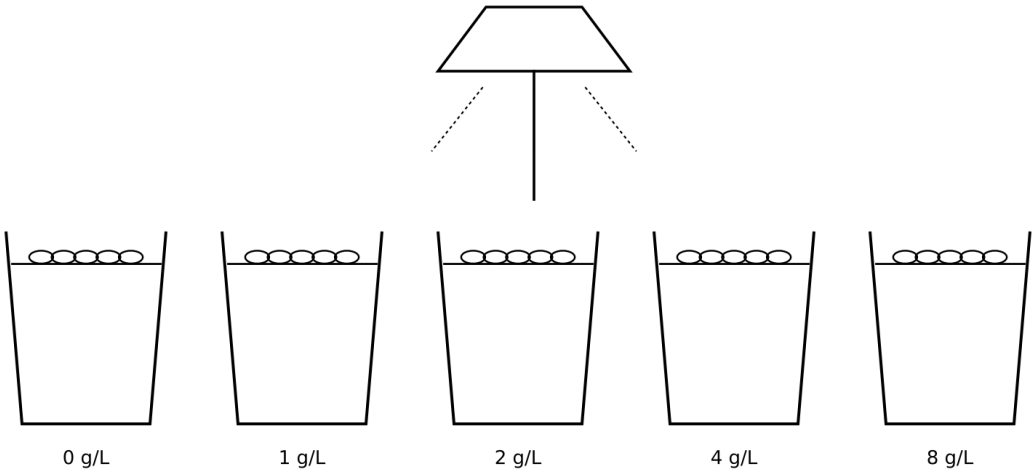
How does salt concentration affect the growth rate of a duckweed population?

Safety

- Wash your hands after handling duckweed and pond water.
- Never pour duckweed down the drain or outdoors. Your teacher will dispose of it.

Materials (per group)

- 5 clear cups labeled 0, 1, 2, 4, and 8 g/L
- 1 L of aged tap water with plant fertilizer (from your teacher)
- Non-iodized salt, balance, spoon, 250 mL graduated cylinder
- 50 duckweed fronds, toothpick or plastic spoon
- Hand lens, lamp



Five cups, each starting with 10 fronds, under the same lamp.

CC BY-NC-SA 4.0 | zornscience.org

Before the Lab

1. Calculate the grams of salt for 200 mL of each solution. (Hint: 200 mL is 0.2 L.)

2. Predict the shape of a graph of growth rate (y) against salt concentration (x). Sketch it in the space.

Procedure

1. Measure 200 mL of fertilizer water into each cup. Add the salt you calculated and stir until dissolved.

2. Use a toothpick to move exactly 10 healthy green fronds into each cup. Count each frond, even small ones attached to a bigger one.

3. Place all five cups side by side under the lamp, about 20 cm away.

4. Every 2 days, count the fronds in each cup and note any yellow or white fronds. Do not count fronds that are fully white.

5. Continue for 7 to 10 days.

Data

Table 1. Frond counts

Salt (g/L)	Day 0	Day 2	Day 4	Day 7	Growth rate (final ÷ 10)	Notes
0	10					
1	10					
2	10					
4	10					
8	10					

3. Graph the growth rate (y) against salt concentration (x). Label both axes with units.

CC BY-NC-SA 4.0 | zornscience.org

Analysis

4. Describe the trend in your graph in one or two sentences, using numbers.

5. Identify duckweed's **optimum range**, a **zone of stress**, and where the **limit of tolerance** appears to be.

6. A growth rate below 1 means the population got smaller. Which cups, if any, were below 1? What does that mean for births and deaths?

7. Is salt a density-dependent or density-independent limiting factor? Explain.

8. The 0 g/L cup grew fastest. Predict what would happen to it if you kept counting for 4 more weeks. Name the kind of growth.

9. Claim, evidence, reasoning: Could winter road salt act as a limiting factor for duckweed in a local pond?

Claim

Evidence

Reasoning

CC BY-NC-SA 4.0 | zornscience.org