

Which Crops Tolerate Salt?

County of Dixon
Road Services Extension Office

Dear extension officers:
Every year, we have significant snowfall and ice on our roads. I appreciate your efforts to make the roads safe for travel, but every spring I become concerned about the damage done by this road clearing. In particular, I am worried that the salt used to melt snow and ice harms the crops we have planted near Route 4. I wonder if you could tell me which kinds of crop plants can best tolerate the yearly accumulation of salt. Thanks for your help.

Yours truly,
Joan Smith
Owner, Dixon Valley Farms

When Joan Smith's letter arrives at the county office, Extension Officer Tom Watts is curious. He's not aware of any especially salt-tolerant crops, so he decides to use this question as the basis for an investigation. He decides the best way to find plants that tolerate salt is to raise seeds from different plants using different concentrations of saltwater solutions. In this way, he thinks he can find out which seeds germinate best.

OBJECTIVES

Develop a research question regarding crop seed germination and saltwater concentrations.

Compare germination success of different seeds to see how well they tolerate salt water.

MATERIALS

- eye dropper
- funnel
- measuring cup and spoon
- paper towels
- plastic bottles, 3 L with caps (4)
- permanent marking pen
- plant seeds: alfalfa, clover, wild rye, wheat grass, and fescue
- salt, table
- self-sealing plastic bags, 1 gal. (4)
- small pots and soil (optional)
- stapler and staples
- water



Which Crops Tolerate Salt? *continued***Procedure**

1. How could Tom state the problem he's investigating?

2. Make a very concentrated saltwater solution by mixing 300 g of table salt in 3 L of water. Store this solution in a sealed 3 L bottle for 24 hours. This is the "0% dilution" solution.
3. Choose and prepare three dilutions of this standard solution. Use Table 1 to find out how much of the standard solution to mix with a given amount of fresh water for each dilution. For example, to make a 60% dilution, mix 200 mL of the standard solution with 300 mL of fresh water. Make sure to label each solution bottle.

TABLE 1: DILUTION RECIPES

Dilution	Standard Solution (control)	Fresh Water
0%	500 mL	0 mL
10%	450 mL	50 mL
20%	400 mL	100 mL
30%	350 mL	150 mL
40%	300 mL	200 mL
50%	250 mL	250 mL
60%	200 mL	300 mL
70%	150 mL	350 mL
80%	100 mL	400 mL
90%	50 mL	450 mL
100%	0 mL	500 mL

4. List the dilutions you made below.

5. Use the plastic self-sealing bags as germination chambers. You will need one bag for each salt dilution you plan to test. Lay each bag flat. Then cut or fold a paper towel and fit three layers flat inside each plastic bag.

Which Crops Tolerate Salt? *continued*

6. Use an eye dropper to lightly moisten the entire paper towel with 15 mL of one dilution of saltwater and seal the bag. With the marking pen, label the bag with its saltwater dilution.
7. Starting at the bottom of the bag, make a row of 10 evenly spaced seeds, using one kind of seed. Use the marking pen to label the type of seeds in this row on the plastic bag. Separate this row of seeds from the next row by stapling several staples across the width of the bag. The seeds should be visible through one side of the bag.
8. Repeat step 7 for the remaining four seed types. Why is it important to put each seed type in a separate row?

9. Repeat steps 6 through 8 for each saltwater dilution. Finally, use fresh water (100% dilution) for one bag of seeds. Why is it important to use fresh water in one bag of seeds?

10. Set aside each of the prepared dilutions. Place the bags out of direct sunlight and away from heat for 10 days. Wet them down daily with the same saltwater dilution initially used. After 10 days, record your observations for each dilution in a table like the one below.

Seed Type	Number Planted	Number Germinated	Percent Germination (No. Germinated/ No. Planted)

Which Crops Tolerate Salt? *continued*

Analysis

- 1. Organizing Data** Summarize your class results in a data table on the board where everyone can see it.
- 2. Examining Data** Based on your results, what seeds can Tom Watts recommend for planting in salty areas?

Conclusions

- 3. Evaluating Methods** Why is it important to know what percentage of the control group (100% dilution) germinated?

- 4. Interpreting Information** What percentage of the control group germinated?

- 5. Drawing Conclusions** Which seeds are the most salt-tolerant? How can you tell?
