



HOW SALINITY AFFECTS FRESHWATER PLANTS

Objective: To observe the effects of saltwater on freshwater plants over a period of several weeks

Age Group: Any

Materials:

- 6 small plant pots or large plastic cups (bonus points for using your recycled yogurt cups/milk jugs! Just make sure to poke 2-3 small holes in the bottom for drainage)
- 6 small plants that have already sprouted and are easy to grow, like beans or sunflowers
- Measuring spoons and cup
- Table salt
- Water
- Potting soil
- Gravel or small pebbles

Curriculum Connection:

3.L.2: Ecosystems

3.E.2: Earth Systems, Structures, and Processes

8.L.3: Ecosystems

What you need to know:

Salinity is the measure of salt in water. Saltwater along the coast has a high salinity, and so do the wetlands that receive tidal waters. Plants found in tidal wetlands like saltmarshes are salt-tolerant. Plants elsewhere in the state typically do not respond well to salinity, because the salt effectively prevents the roots from absorbing the water it needs. Freshwater wetlands are found throughout the state and the plants that live there are typically able to thrive, but sometimes salinity levels rise and negatively impact freshwater plants' ability to grow and survive. The salinity in wetlands can increase due to agricultural and stormwater runoff that sometimes contains salts, as well as through saltwater intrusion and the encroachment of surface saltwater during storm events. Large areas of North Carolina's coastal wetlands are changing from forested freshwater wetlands to brackish and salt marshes as a result of salinity changes.

In this activity, students will observe how freshwater plants respond to different levels of salinity in the water they receive. Seawater has a salinity of roughly 35,000 ppm, equivalent to 35 grams of salt per one liter (or kilogram) of water. Brackish water can range in salinity from 3,000 to 10,000 ppm.

The activity:

- ❖ Place a thin layer (~ $\frac{1}{2}$ inch) of gravel on the bottom of all pots to help with drainage
- ❖ Top off the gravel with potting soil, leaving enough room to place seedling on top
- ❖ Place seedling into pot, and fill remaining space with potting soil, being careful not to cover up the base of the seedling
- ❖ Experiment set-up
 - 2 cups will be freshwater only. These cups are the control.
 - 2 cups will be watered with a brackish water solution ($\frac{1}{4}$ tsp salt per 1 c water)(5,200 ppm)
 - 2 cups will be watered with a saltwater solution (1.5 tsp salt per 1 c water)(31,250 ppm)
- ❖ Water the plants per the plant instructions, using the 3 different solutions
- ❖ Have students form a hypothesis for each of the 3 plant groups, and keep an observation journal for 4-6 weeks as they watch the growth of each plant
- ❖ At the end of the experiment, discuss findings and form a conclusion

ALTERNATIVE EXPERIMENT:

- ❖ Set up experiment exactly as described above
- ❖ 2 plants will be watered with freshwater continually, while the others will be watered alternately with freshwater and saltwater
- ❖ Water 2 plants with freshwater for one week, then saltwater the next, then freshwater (to simulate a pulse of salty pollution)
- ❖ Water 2 plants with freshwater and saltwater, alternating each day (to simulate a tidal influence from rising sea level)
- ❖ At the end of the experiment, discuss findings and form a conclusion
- ❖ How did plants recover from exposure to saltwater? Did length of exposure play a part? How did they compare to the plants that received freshwater the whole time?