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Salt Tolerance Experiment
Grades: 5-8

Materials needed:
- 2-liter pop bottle or a clear plastic container approximately 10-12 inches tall
- Potting soil
- Water
- Table salt
- Ruler
- A cutting utensil (to cut the pop bottle)
- A scale that will measure in grams

Objective
The Salt Tolerance Experiment is designed for a 5th – 8th grade learning level. This project allows students to learn how different amounts of naturally occurring minerals in the soil can affect plant growth. The Salt Tolerance Experiment also exposes the students to a more advanced data collection process, as well as touching on the important use of the scientific method.

Experiment procedure:

1. Plant the poplar cutting in a clear container to allow the students to see the roots form and the tree grow.

   The students should each provide a clear 2-liter pop bottle. Remove the label, then measure 10 inches up from the bottom of the 2-liter bottle and make a mark. The mark is where the students should cut the top of the bottle off, leaving them with an open container to plant their poplar cutting. Finally poke a few holes in the bottom of the bottle as drainage holes for excess water.

2. Before the students have the trees planted in the containers, have them weigh the poplar cutting and measure the diameter (this way they can develop a baseline of information).

3. Have the students hold the poplar cutting in their container, at this time the students can start filling the container with the potting soil. Make sure the students leave one or two leaf buds (approximately 1-2 inches) above the soil. The buds should point up, not down.

4. Have the students water their poplar cutting with enough water so that the water starts to run out of the bottom of the container through the drain holes.

5. Let the trees start to grow and develop at least five leaves (usually takes 2-4 weeks). During

this time period, only water the trees if the soil appears dry.

6. After the trees have developed at least five leaves and before the students start watering the trees with the saltwater solution, have the students take measurements of the leaves as well as the height and the diameter of the trees. This is to develop a baseline for the project.

7. Split the students up into approximately 6-10 groups. Each group will water their trees with a different amount of salt. Watering should only occur if the soil looks dry (approximately once a week). The table below explains how much salt to add to 1-liter of tap water. The students can mix an entire liter up and use it until they run out of water. Make sure the saltwater solution is completely mixed each time before watering. In the table the percent saltwater is comparing the amount of salt in the student's watering solution to the amount of salt found in seawater. For example, 11% saltwater means that the solution has 11% the amount of salt that seawater contains.

Group	% Saltwater	How many grams of salt to add to 1 liter of water
1 (control)	0	0
2	3%	1 g
3	6%	2 g
4	9%	3 g
5	14%	5 g
6	17%	6 g
7	34%	12 g
8	71%	25 g
9	100% (saltwater)	35 g

8. Once all the students have mixed the salt solution, you can then water the trees. The students should water the trees approximately once a week after that or if the soil looks dry.

9. After approximately one week of watering with the saltwater solutions the students should measure the leaves from their tree, as well as the height and diameter of the tree. You might have the students make a mark on the tree so that they can measure the tree from the same point each time. The students should make new saltwater solution as needed. Water the trees with saltwater and take measurements for 3-10 weeks (or however long you want to run the experiment).

10. The procedure described in Step #9 should be repeated 3-10 times in order for the students to gather enough data to show an appropriate graphical change in their results. To gather enough data the experiment should take about 3-10 weeks if you have the students take a reading every 3-5 days. Make sure as the experiment progresses that the students water the soil when it starts to get dry with the appropriate saltwater solution.

11. The students can end the project by taking a final set of measurements, then stripping all the leaves off the tree and weighing the leaves. The students should dig in the soil to find the majority of the root system and weigh the roots. Finally, the students should weigh the stem of their tree. The students can then compare total tree weights to learn how salinity can impact how a plant grows.

    A scientific way to show the comparison is in the foliar change and size of the plant. The

students can achieve this by a graphical representation of their data. The students can graph such data as leaf size, tree diameter, number of leaves, leaf mass, stem mass, root mass and total tree mass. The students can graph some or all of the data and compare it with the other student's data about how their tree reacted to the different salt solutions.

Conclusion

Ecolotree would like to thank you for the purchase of a "Phyto-Kids Fun Kit." Hopefully your students will have fun and learn a little more about how salinity affects plant growth.

If you have any questions, please contact Aaron Shultz at Ecolotree, Inc. (aaron-shultz@ecolotree.com, or by phone (319) 665-3547).

To order trees please mail a check to Ecolotree Inc. at 3017 Valley View Lane NE, North Liberty, IA 52317.
If more information is needed please email (aaron-shultz@ecolotree.com) or call (319) 665-3547

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Phyto-Kids Fun Kits available:
(includes school discount)

- ☐ 250 cuttings, $220
- ☐ 100 cuttings, $99
- ☐ 50 cuttings, $65
- ☐ 25 cuttings, $40

Kits include 3-day shipping within the continental United States. Trees are available between the months of November and July.