

Turgor Pressure and Plasmolysis

Water movement is similar in plant and animal cells, but in plants the cell walls cause the cell to act differently when water enters by way of osmosis. The osmotic pressure that develops within plant cells is called turgor pressure, and swollen cells are said to be turgid. The shrinking of the cytoplasm, due to loss of turgor pressure, is called plasmolysis.

Materials

red onion or stem of rhubarb
celery stalks
250 mL beaker
15% salt solution
forceps
distilled water
compound microscope
scalpel
scissors
microscope slide

Procedure

A. Physical effects of solute

1. Into a 250 mL beaker add 200 ml of distilled water, and into another add the same amount of salt solution.
2. Cut two 0.5 cm x 7.0 cm celery sticks and place one in each beaker.
3. After 30 minutes, bend the sticks to determine their crispness. Record your observations.

B. Microscopic observation of effects of solute

4. Using forceps, remove a thin piece of the epidermis from the red vegetable. Trim the tissue with scissors to obtain a piece that is roughly 1 cm by 1 cm.
5. Prepare a wet mount.
6. Examine the slide using a compound to clearly observe the plant cells. Use the highest power you can. The colored substance in each cell is inside the central vacuole. Record your observations.
7. Place a drop of salt solution against one side of the cover slip and a piece of small piece of paper towel on the other side. The salt solution will be drawn across the slide by capillary action.
8. Observe the specimen under the microscope until a change occurs. Use the highest power possible. Record your observations.

Questions

1. Which celery stick was crisper?
2. Which solution was hypertonic and which was hypotonic relative to the cytoplasm of the celery cells? How do you know
3. What is turgor pressure?
4. When you looked under the microscope, was there evidence to indicate that the plant cells are under turgor pressure?
5. What cell structure becomes evident when plasmolysis has occurred?
6. Does the size of the plant cell change during plasmolysis?

7. Why did the onion cell plasmolyze?
8. Why is maintaining turgor pressure important to plants?
9. Wilted lettuce can often be made crisp again by placing it in cold water for a while. Explain.
10. In the winter, grass often dies near roads that have been salted to remove ice. Explain.