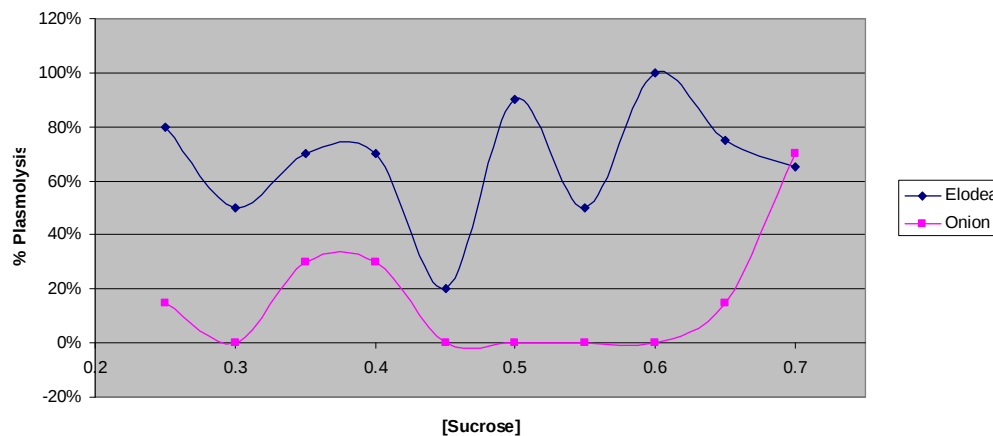


Comparison of Osmotic Potentials in Aquatic and Terrestrial Plants

Summary: My group and I tested samples of elodea cells and red onion cells to measure the osmotic potentials between these two unique species of plants. We applied varying concentrations of sucrose solutions to each cell type and observed through a microscope the cellular breakdown that occurred. Additionally, we attempted to determine the approximate molarity range of the sucrose solution for when incipient plasmolysis would occur in each plant sample: ~50% collapsed cell membranes. Our results showed that 1) elodea cells have a significantly higher osmotic potential than do red onion cells, and 2) our data for determining incipient plasmolysis was entirely inconclusive and requires a more refined approach or a modified experimental procedure. Our observations regarding elodea cell potential are supported by the knowledge that the osmotic balance of the elodea is affected greatly by being placed in a solution with a lower water concentration than inside the cell (*Ishaq et al., 2001*). It is also known that, when placed in a hypertonic solution, hypotonic cells lose water to their surroundings (*Raven et al., 2008*).

Methods & Results: For elodea and red onion cell observations, each member of our group created microscope slides using small samples of one plant species placed within drops of sucrose solutions, ranging in concentration from 0.25M to 0.70M. We ensured that all samples were quickly removed from their original environments and placed within the sucrose solution on the slide to prevent unnecessary exposure to the air, which causes additional loss of moisture. Each sample was left in solution for five minutes, which ensured that there was ample time for the cells to become isotonic in their new environment. We then viewed our slides under a microscope and, simply by counting cells, created an approximate ratio of the number with collapsed membranes to intact membranes. This produced the following graph of data:



Our results clearly show that elodea cells have a much higher osmotic potential than do red onion cells. However, the curved lines connecting data points also indicate a very large degree of inconsistency; data varies too much to make any determinations about when incipient plasmolysis occurs for either species of plant (although data for the red onion cells is somewhat better and might suggest a value of 0.65M to 0.70M).

We have determined that refined experimental techniques or a modified experimental procedure are necessary to measure acceptable values for incipient plasmolysis in elodea cells and red onion cells.

References:

Ishaq, S. & Madrid, M. & Solorio, K., 2001. The Effects of Saline Concentration on Elodea Canadensis, *NAFEO High Tech Student Expo*, 1, pp. 69-73.
Raven, P. & Johnson, G. & Losos, J. & Mason, K. & Singer, S., 2008. *Biology*, 8th ed., McGraw-Hill.