

Osmosis



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Introduction

In this investigation I am investigating if varying the amount of sugar solution or distilled water determines the concentration of cell sap. I will do this by using different concentrations of sugar solution and distilled water. If the medium is hypotonic — a dilute solution, with a higher water concentration than the cell — the cell will gain water through osmosis. However if the medium is isotonic — a solution with exactly the same water concentration as the cell — there will be no net movement of water across the cell membrane. If the medium is hypertonic — a concentrated solution, with a lower water concentration than the cell — the cell will lose water by osmosis.

Investigation variables

To have a controlled reliable investigation I will control the following variables:

1. To try my best to do the experiments at the same room temperature.
2. I will prepare the carrots in the same way because any minor changes can ruin the experiment.
3. The mass of the carrots is a dependent variable and this terminology means that the piece of carrot will be measured constantly throughout the experiment. I will measure in grams, in addition the piece of carrot will be measured before and after it is put into the solution, this will
4. ~~allow us to see if the concentration of the solution affects the carrot pieces~~ ~~are put in~~ must be same for all of them for example all of them should be covered in what is supposed to be covered in.
5. Also I am going to use the same set of scales to measure the carrot pieces in the solution. This is because measurements may vary
6. ~~between trials~~ ~~because~~ ~~everything~~ ~~was~~ ~~under~~ ~~control~~ ~~to~~ ~~make~~ ~~my~~ ~~results~~ ~~very~~ ~~reliable~~.

My hypothesis

I predict that the less sugar solution we use the higher the concentration of the cell sap would be.

Plan

- First I will take some xylem cells from inside of the carrot and some phloem from the outside of the carrot
- I will take 15 samples of each type of cell from each carrot
- I will put 3 samples in each solution
- I would then leave it for 1 hour
- Then I would reweigh its mass
- Then plot these results onto a graph
- And then where the line crosses 0 is the concentration of the cytoplasm

Results

Before:

	Carrot 1 Xylem	Carrot 1 Phloem	Carrot 2 Xylem	Carrot 2 Phloem	Carrot 3 Xylem	Carrot 3 Phloem
0.0 m	0.75	0.16	0.75	0.16	0.75	0.16
0.25 m	0.75	0.16	0.75	0.16	0.75	0.16
0.5 m	0.75	0.16	0.75	0.16	0.75	0.16
0.75 m	0.75	0.16	0.75	0.16	0.75	0.16
1.0 m	0.75	0.16	0.75	0.16	0.75	0.16

After:

	Carrot 1 Xylem	Carrot 1 Phloem	Carrot 2 Xylem	Carrot 2 Phloem	Carrot 3 Xylem	Carrot 3 Phloem
0.0 m	0.87	1.69	0.88	1.77	0.83	1.74
0.25 m	0.84	1.84	0.85	1.94	0.86	1.82
0.5m	0.8	1.74	0.66	1.74	0.85	1.77

0.75 m	0.72	1.48	0.68	1.44	0.76	1.45
1.0 m	0.62	1.34	0.67	1.38	0.64	1.42

	Before	After
0.0m	1.9	2.05
0.5 m	1.97	2.11
1.0 m	1.97	1.8

Differences:

	Carrot 1 Xylem	Carrot 1 Phloem	Carrot 2 Xylem	Carrot 2 Phloem	Carrot 3 Xylem	Carrot 3 Phloem
0.0 m	+ 0.12	+ 0.09	+ 0.13	+ 0.17	+ 0.08	+ 0.14
0.25 m	+ 0.09	+ 0.24	+ 0.1	+ 0.34	+ 0.11	+ 0.22
0.5m	+ 0.05	+ 0.14	- 0.09	- 0.14	+ 0.1	+ 0.17
0.75 m	- 0.03	- 0.12	- 0.07	- 0.16	+ 0.01	- 0.15
1.0 m	- 0.13	- 0.26	- 0.08	- 0.12	- 0.11	- 0.18

Xylem:

C1	C2	C3	Mean
+ 0.12	+ 0.15	+ 0.14	+ 0.13
+ 0.09	+ 0.1	+ 0.11	+ 0.1
+ 0.05	- 0.09	+ 0.1	+ 0.88
- 0.03	- 0.07	+ 0.01	- 0.03
- 0.15	- 0.12	- 0.11	- 0.11

Outlier

Phloem:

C1	C2	C3	Mean
+ 0.09	+ 0.17	+ 0.14	+ 0.13
+ 0.24	+ 0.34	+ 0.22	+ 0.23
+ 0.14	+ 0.14	+ 0.17	+ 0.15
- 0.12	- 0.16	- 0.15	- 0.14
- 0.26	- 0.12	- 0.18	- 0.05

Outlier

Conclusion

As I conclude I can say that in my investigation I found out that the more sugar solution you cover in the carr ot piece the higher the concentration of cell sap would be and there would be more osmosis activity. However what does mystify me is what you can see above, the two outliers because they don't surprisingly fit with the others but I am sure that if we do this investigation again there would be two outliers or less.