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Block B

Photosynthesis Lab -- Analysis

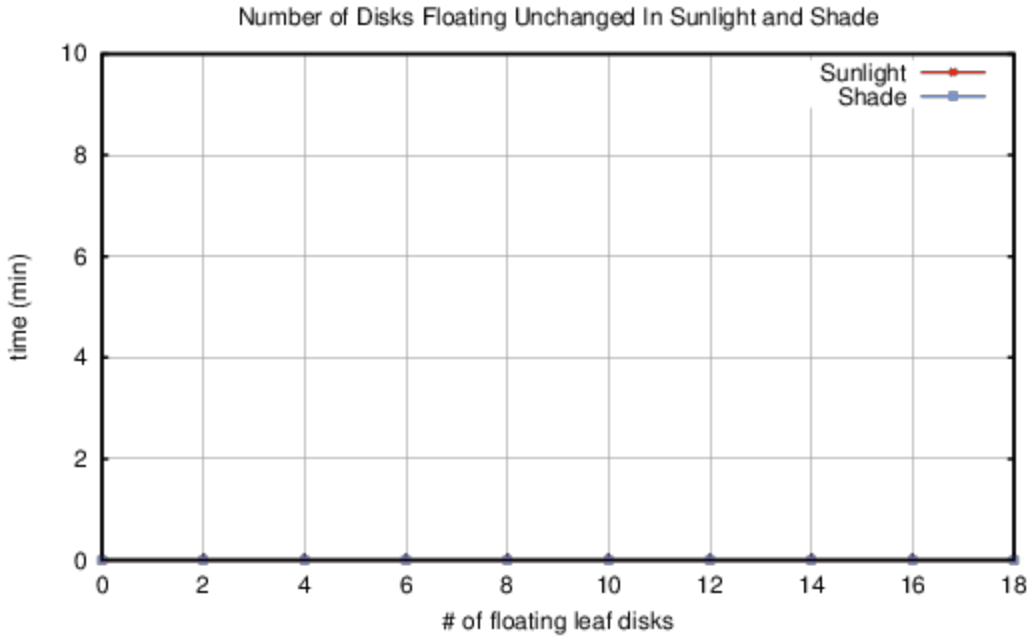
Hypothesis:

The time taken for half the leaf disks to float in the sample treated with bicarbonate under sunlight will be significantly lower when compared to the time taken for the leaf disks to float in the sample treated with bicarbonate in shade.

Data Table and Graph:

Experimentally Collected:

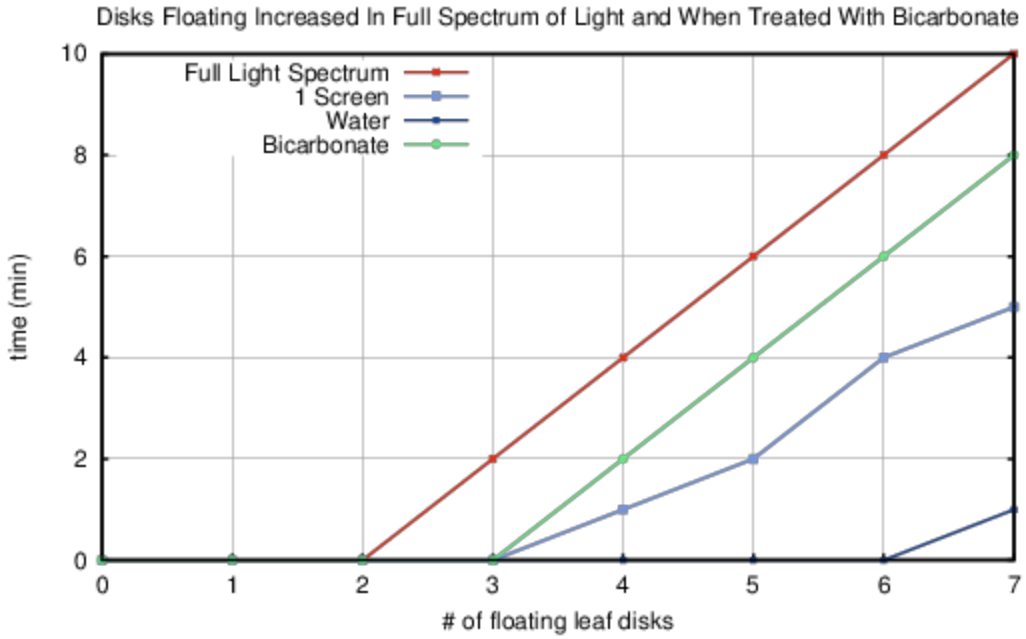
	sun light (bicarb)	shade (bicarb)
time (mins)	# disks floating	# disks floating
2	0	0
4	0	0
6	0	0
8	0	0
10	0	0
12	0	0
14	0	0
16	0	0
18	0	0



Note: The lines is hard to see but on the x-axis.

Sample Data:

	water	bicarb	1 screen	full spectrum light
time (mins)	# disks floating	# disks floating	# disks floating	# disks floating
1	0	0	0	0
2	0	0	0	0
3	0	0	0	2
4	0	2	1	4
5	0	4	3	6
6	0	6	4	8
7	1	8	5	10



Calculations:

Experimentally Collected Data:
Cannot calculate T1/2 (time when half the leaf disks floated) because no disks floated after 18 minutes of data collection where the experiment was stopped due to time limitations. Due to this problem, sample data will also be used in this analysis.

Sample Data:
T1/2 (water) = 35 min
T1/2 (bicarb) = 5.5 min
T1/2 (1 screen) = 7 min
T1/2 (full spectrum light) = 4.5 min
Note: Some T1/2's were identified by averaging the time between when the 4th and 6th leaf disks floated and others calculated by multiplying the time float one disk to float by 5.

Conclusion:

Experimentally Collected Data:
No conclusion about shade and sunlight can be drawn from the experimentally collected data. Possible sources of error however could have been the over treatment of the leaf disks by excessive use of the vacuum removal of gas. In the procedure, it was indicated that excessive treatment could damage leaf disks. Another source of error could be the leaf disk sizes used. The sizes used to collect data in this experiment may have been too small to produce enough gas and begin floating. With small leaf disks the disks could have been damaged when being punched from the leaf or during counting by crushing the disk. This source of error would be most impactful on the data with the use of smaller disks.

Sample Data:
Using the sample data it can be concluded that the full spectrum of light, sunlight, is best for photosynthesis because this condition had the lowest T1/2 time and therefore the fastest rate of photosynthesis in the disks when compared to the rate of floating disks and therefore rate of photosynthesis in the experiment shielded by a screen, shade. This conclusion is consistent with the hypothesis. This result was most likely observed because with more light present (and all wavelengths present), more Photosystems can be activated starting the process of photosynthesis. With less light, as in shade, the chances of a photon hitting chlorophyll in the correct spot are decreased, therefore fewer Photosystems can be activated, slowing the process of photosynthesis. Using the sample data again it can also be concluded that treatment with bicarbonate is best for photosynthesis because this condition had the lowest T1/2 time and therefore the fastest rate of photosynthesis in the disks when compared to the rate of floating disks and therefore rate of photosynthesis in the disks treated with water. Since this is concluded from the sample data, this conclusion is not represented in the hypothesis. This result was most likely observed because the vacuum treatment replaced the gas in the leaf disks with whatever the solution was, water or bicarbonate. The bicarbonate ion was likely used by Rubisco and bound onto RuBP to start the Calvin Cycle part of photosynthesis where carbon dioxide is used. This in turn would produce O_2 gas that would make the leaf float, but Rubisco could not bind water to RuBP to start the Calvin Cycle, so photosynthesis would slow in the leaf disks treated with water. This explanation is probably the reason for the results observed in the sample data.