

Making Algae (Phytoplankton) Grow

Adapted from Building a Bloom

Bigelow Laboratory for Ocean Sciences

http://www.bigelow.org/edhab/building_bloom.html#Stepnine

This is Lesson 1, Activity 1 of *The Feeding Frenzy: Seasonal Upwelling Teaching Box*. Results will be used for Lesson 2, Activity 1.

Purpose: The purpose of this activity is to demonstrate the conditions needed for optimum growth of algae.

Materials:

- algal cultural (can be obtained from a scientific or aquarium supplier or even from a classroom aquarium)
- water (fresh or salt depending on the algae used)
- large (20 – 50 mL capacity) test tubes, baby food jars, or other glass containers and lids, stoppers, or something to seal the containers with. 4 containers will be needed for each group of students.
- aluminum foil
- available light source (sunny window or artificial)
- droppers or pipettes
- liquid fish fertilizer (available from gardening suppliers)
- wax pencils or markers and masking tape for labeling containers

Procedure:

1. Provide each group of students with four containers. Have students label the containers as follows:
 - i. + Sun, + Nutrients, Group Name or Number
 - ii. + Sun, - Nutrients, Group Name or Number
 - iii. - Sun, + Nutrients, Group Name or Number
 - iv. - Sun, - Nutrients, Group Name or Number
2. Add 15 mL of water to each test tube or container.
3. Add 5 drops of algal culture to each container.
4. Add 5 drops of liquid fish fertilizer to each container labeled “+ Nutrients”.
5. Completely cover each container labeled “- Sun” with aluminum foil, so that no light can penetrate the container.
6. Seal each container securely to avoid evaporation.
7. Place all containers in a sunny window or under an artificial light source where they can receive equal amounts of light and they can be exposed to the same temperature (i.e., don’t place some on a heater and others near an open window).

8. Have students write a prediction that ranks the containers in order from most growth expected to least growth expected and justify their predictions.
9. Over a period of 1 – 2 weeks, record the color, smell, degree of clarity, and any other observations of the sample in each container in the accompanying data tables.
10. Look over the data gathered at the end of the 1 – 2 week period and have students answer the following questions:
 - a. Under what conditions did algae grow?
 - b. Under what conditions did the algae grow best?
 - c. Under what conditions was there no growth?
 - d. What do the results of this experiment tell us about the needs of phytoplankton (a type of algae) in the ocean?
11. Using the sample found at http://www.bigelow.org/edhab/example_graph.html as a guide, create a graph to illustrate the findings with algal growth (determined by color) on the y-axis versus number of days on the x-axis.

Suggestions for More Complex Experiments and High School Extensions:

- Keep track of algal density with cell counts in addition to color detection. Use microscopes, slides and cover slips to do cell counts of the cultures over time. Create graphs of cell density (determined from your counts) over time.
- Add treatments to test different concentrations of fertilizer. Create graphs of cell density versus fertilizer concentration for each sample time.
- Use nutrient mixes rather than a commercial fertilizer. This will allow students to test the effects of specific nutrients on the growth of their alga. Create graphs of final cell density versus nutrient concentration for each nutrient treatment.
- Add treatments to test the effect of sunlight/darkness on algal growth. Create graphs of cell density over time for the different light treatments.
- Use more than one species of algae (grown separately) to compare the growth of different species under similar conditions.
- Add treatments to test the effect of temperature or salinity on algal growth. Create graphs of final cell density versus temperature or salinity.

Making Algae (Phytoplankton) Grow – Data Tables

OBSERVATIONS - DAY 1

Container	Color	Smell	Clarity (How clear is the sample?)	Other Observations

OBSERVATIONS - DAY _____

Container	Color	Smell	Clarity (How clear is the sample?)	Other Observations

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