



How to Grow Red Seaweed

Grades: 3-5

Subject: Science, Language Arts

Time: 45 minutes along with weekly journal entries

***Standards:** Students will...



Science Standard 5: Understand the structure and function of cells and organisms.

Benchmark # 2: Know that living organisms have distinct structures and body systems that serve specific functions in growth, survival and reproduction (e.g., seaweeds' holdfast, stipes).

Science Standard 6: Understand relationships among organisms and their physical environment.

Benchmark # 3: Know that an organism's patterns of behavior are related to the nature of that organism's environment (e.g., physical characteristics of the environment).

Science Standard 7: Understands biological evolution and the diversity of life.

Benchmark # 2: Know the different ways in which living things can be grouped (e.g., plants/animals, live on land/line in the water) and purposes of different groupings.

Science Standard 12: Understand the nature of scientific inquiry.

Benchmark # 3: Plan and conduct simple investigations.

Benchmark # 4: Use appropriate tools and simple equipment (e.g., thermometers) to gather scientific data and extend the senses.

Language Arts Standard 1: Use the general skills and strategies of the writing process.

Benchmark # 7: Write expository compositions (e.g., develop the topic with simple facts, details, examples, and explanations, use structures such as cause-and-effect, chronology, similarities and differences).

Objectives: Student will be able to...

- Identify and describe the basic needs of seaweed.
- Identify and describe the similarities and differences between green plants and algae as relates to their physical structure, growth, change, and movement.
- Collect, organize and record data using a variety of graphic representations.
- Write an expository piece about the seaweed investigation that provides facts and details, and describes, analyzes and draws conclusions.

Materials:

- Aquarium
- Fresh red seaweed
- Rock
- Salt
- Thermometer
- Water
- Liquid fertilizer
- Notebooks or charts
- Sample chart provided below
- Pens or pencils

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Overview: Seaweeds, often mistaken as plants, are actually simple living organism called algae. While similar, they don't have the same basic structures and lack the vascular systems of land plants. Instead of root systems and stems, seaweeds have holdfasts and stipes. They use the holdfasts to anchor themselves to surfaces and the stipes for support. They absorb the nutrients, gases and liquids they need for growth directly from the water in which they live. Many varieties of seaweed also have a float, which is a hollow, gas-filled structure that aids in keeping the seaweed buoyant, so it can absorb sunlight. In this way, seaweeds are like land plants, both using the process of photosynthesis to make the food they need to grow.

Seaweed is found worldwide. There are three basic types of seaweed: brown, green and red. Brown and red seaweed are exclusively saltwater species, where green may be found in both salt and fresh water habitats (lakes and rivers). Many species live in the inter-tidal zones where they are exposed to harsh conditions. As tides move in and out, seaweeds have to survive water loss, changes in temperature and salinity, and rough seas that can rip them from where they have anchored themselves.

The majority of seaweed species are red seaweeds. Over 6,000 varieties have been identified. Unlike the other two types, red seaweeds grow in both inter-tidal zones, and in deep waters (approximately 40+ meters). Some varieties have been found as deep as 250 meters. This is possible because their red pigment allows them to absorb blue light, which can penetrate deep water, thereby allowing the red seaweeds to obtain energy so they can survive in relative darkness.

Red seaweeds are an excellent source of nutrition, rich in vitamins and minerals. Three in particular, Nori, dulse, and Carrageen Moss, are widely used in food preparation, especially in Asian countries. Seaweed is used in making soups, stocks, salads, sushi, and steamed as a vegetable. It is dried, ground and made into flatbread. Extracts from seaweeds are found in chocolate milk, ice cream, health drinks, yogurt, puddings, cottage cheese and pasta. Seaweeds are also used for medicinal purposes and are used in the prevention of heart disease, cancer, and managing high blood pressure and cholesterol. Additionally, they are used in toothpaste, cosmetics, fertilizers and the production of certain chemicals. They are a valuable and still somewhat untapped, natural and renewable resource.

Kid's Speak: Seaweeds are not plants. They are simple organisms called algae. While most people classify them as plants, seaweeds do not have the same basic structures as plants that grow on land. Seaweeds do not have the internal transportation system that moves the water and nutrients around and inside land plants. Instead of roots and stems, seaweeds have holdfasts and stipes. They use the holdfasts only to attach themselves to rocks and other surfaces, and the stipes for support. They do not need an internal transportation system because each part of the seaweed takes the nutrients and other things it needs directly from the water surrounding it. Seaweeds do use photosynthesis to make food just as land plants do, and they have a hollow part called a float, which is filled with gas and keeps the seaweed upright in the water so it can absorb sunlight.

There are three kinds of seaweed: brown, green and red. Brown and red seaweed live in saltwater. Only green seaweed lives in both salt and fresh water. Most seaweed is red. There are more than 6,000 different kinds of red seaweed. Unlike the other two types, red seaweeds grow both near the shore and in deep water.

Red seaweeds are often used in cooking and food preparation, especially in Asian countries. They are very good for us. Seaweed is used to make soups, stocks, salads, sushi, and it is steamed as a vegetable. It can be found in chocolate milk, ice cream, health drinks, yogurt, puddings, cottage cheese and pasta. Some seaweed is used to make medicines. They help prevent heart disease and some kinds of cancer. Seaweeds are also used in making toothpaste, cosmetics, fertilizers and some chemicals.



Eco-Fact: The structure of red seaweed is different from other seaweeds. It has a very rubbery, almost elastic quality to it.

Procedure:

Before Planting Seaweed:

- Review the basic structures of green plants and their functions. Compare the structures of seaweed with the structures of green plants and identify how they differ.
- Explain the basic needs of seaweed and discuss the similarities and differences as compared to green plants.
- Discuss the various types of seaweed and the current and potential uses of seaweed around the world.

Procedure for Planting Seaweed:

1. Begin by creating the salt water mixture. The temperature of the water should be 81 degrees Fahrenheit. Add 1/2 to 1 teaspoon of salt per gallon of water. Stir the water and allow it to sit for 24 to 36 hours.
2. Fill your aquarium with salt water and place the large rock into the aquarium.
3. Bring the temperature of the saltwater in the aquarium to at least 72 degrees Fahrenheit. Most large and healthy seaweed plants grow in warm water. In ideal conditions, a red seaweed plant grows to more than 115 feet long.
4. Lower your seaweed into the tank and allow it to attach itself to the rock. Seaweed does not have roots. It filters ingredients out of the water in order to grow.
5. Add liquid fertilizer to the water to allow the seaweed to grow and to give the seaweed nutrients. When the seaweed is young, it is a green color. When it is fully grown, it becomes a dark, reddish purple.

After Planting Seaweed:

- Have students make weekly observations of the seaweed. Ask them to record their observations. Students should note any changes in the seaweed in regards to height, shape, color, and scent in weekly journal entries or on the chart that has been provided.
- After sufficient time has passed, generate a class chart from student observations. Discuss with students any changes that have occurred. Ask questions similar to the following:
 - When did the seaweed change from green to red?
 - How much has the seaweed grown?
 - During which week did the seaweed grow the most? the least?
 - Has there been any change in scent? If yes, what kind of change?
- Have students write a final journal entry summarizing their observations and predicting what changes might take place in the next month.

Date	Height	Shape	Color	Scent	Other Changes

**Adaptations:**

- Students can plant a green plant at the same time as the red seaweed and observe how well both grow over the same period of time. Students can make journal entries for both, and draw comparisons throughout the project.

Extensions:

- Students can use their seaweed to make seaweed art. To make seaweed art, students can arrange their fresh seaweed on a poster board in any design. Once the seaweed dries, the seaweed will stick to the poster board to create seaweed art.
- Students can study cookbooks to find different recipes that contain seaweed.
- Students can make sushi using their seaweed. Students can use ingredients such as cream cheese and any type of meat with their seaweed to make sushi. Students can slice their ingredients into small pieces, place them on the seaweed, and roll up the seaweed to make the sushi.
- For tips on dietary guidelines and healthy eating habits visit the [USDA Food Pyramid](#).

GEF Community: Join the GEF Community online. It only takes a minute. Students can share pictures of their seaweed with the GEF Community.

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* All lessons listed on the GEF website have been aligned with the McREL Compendium of Standards and Benchmarks for K-12 Education. GEF curriculum has been developed in accordance with the McREL standards in order to reflect nationwide guidelines for learning, teaching, and assessment, and to provide continuity in the integrity of GEF curricular content from state to state. The decision to utilize McREL's standards was based upon their rigorous and extensive research, as well as their review of standards documents from a variety of professional subject matter organizations in fourteen content areas. Their result is a comprehensive database that represents what many educational institutions and departments believe to be the best standards research accomplished to date. To access the McREL standards database, or for additional information regarding the supporting documentation used in its development, please visit <http://www.mcrel.org>.