

Education

Limu Pressings



Photo: Credit: Nakoa Goo

Grade Level

3-5

Timeframe

60 Minutes

Materials

- Pre-cut pieces of construction paper, cardstock, or herbarium paper for pressing algae upon
- Pre-cut pieces of wax paper
Approximately 1'x2' in size
- Corrugated cardboard sheets
approximately 1'x2' in size
(2 sheets per student)
- Napkins
- Bowls (1 per type of algae collected)
- Fresh algal specimens
- Laminator
- Heavy object to compress the algal pressings in the drying process
- Microscope (not required)



Photo: Credit: Lisa Van Citters

Activity Summary

Students will learn about the importance of algae in marine ecosystems. They will then participate in an activity to make plant pressings with algae. Once the pressings are dry and laminated, students will take them home to encourage retention of the lesson content out of the classroom.

Learning Objectives

Students will be able to:

- Describe different species of marine algae
- Explain the importance of algae in marine ecosystems and derived commercial products from algae
- Learn to make algal plant pressings
- Learn ways that scientists use pressings to describe different species of algae

Background Information

Limu or algae are extremely important in supporting all life found in the world's oceans. Limu produce 74-87% of the oxygen on the earth. They range from small single celled phytoplankton to larger multi-cellular forms. They are found in a variety of shapes, colors and sizes.

Limu do not have roots like land plants, instead many have a **hold fast** to secure them to the bottom of the ocean. They obtain nutrients from the water surrounding them and use sunlight to create energy through **kā'ama'ai** (photosynthesis).

Limu play an important role in a marine **kālaikāiaola** (ecosystem). They support other animals in the **food chain** by providing food and oxygen required for survival by more complex life forms. Limu are consumed by **hamulau** (herbivores) which are then consumed by **hamui'a** (carnivores).

Scientists study limu because they are good indicators of kālaikāiaola health. As an example, high amounts of limu can indicate a lack of hamulau or land based pollution. In coral reef ecosystems of the Hawaiian archipelago, limu play multiple roles providing food, shelter and habitat necessary for the survival of many species.

The reef kālaikāiaola within the Papahānaumokuākea Marine National Monument are dominated by limu cover because cooler sea surface temperatures limit coral growth here. The characteristics of limu communities in this area remains poorly understood, but its value is manifested in the immense diversity and abundance of wildlife supported by limu.

Ancient Hawaiians utilized a variety of limu species for their nutritional benefits and healing properties. Certain limu were used as medicines and for ceremonies. Limu kala (*Sargassum echinocarpum*) is used as a remedy for cuts and in ceremonies asking forgiveness for wrong doings. There are 500 species of limu found in Hawai'i.

Key Words

- Benthic
- Food Chain
- Hamui'a (Carnivore)
- Hamulau (Herbivore)
- Hold fast
- Kālaikāiaola (Ecosystem)
- Kā'ama'ai (Photosynthesis)
- Limu (Algae)

Limu are needed to create many of the common products we use and consume in our daily lives such as nori, toothpaste, vitamins, medicines, shampoo and ice cream. Limu can also be used as fuel to power automobiles. Creating limu pressings allows us to preserve these plants so they can be described and observed by many people.



Vocabulary

FOOD CHAIN- The transfer of food energy from one organism to another in an ecological community

HAMUI'A (CARNIVORE)- An animal that feeds mainly or primarily on meat

HAMULAU (HERBIVORE)- An animal that eats mainly or only plants

KĀLAIKAIOLA (ECOSYSTEM)- A system that includes all living organisms in an area as well as its physical environment functioning together as a unit

HOLDFAST- The organ of attachment of a seaweed or related plant

KĀ'AMA'AI (PHOTOSYNTHESIS)- The process by which green plants and some other organisms use sunlight to synthesize foods from carbon dioxide and water

LIMU (ALGAE)- Aquatic organisms ranging from microscopic single-celled forms to multi-cellular forms, distinguished from plants by the absence of true roots, stems and leaves

Preparation

- Prepare cardboard, wax paper, napkins and your paper of choice for pressing algae on to for the appropriate number of students
- Collect fresh algal specimens from a marine environment such as a beach or shoreline and let them soak in fresh water
- Place algae in bowls full of fresh water
- Customize paper for algal pressings with information such as algae names, uses and importance (not required)

Procedure

- 1) Start with an introduction to the activity by presenting facts from the background information section (use visual aids such as power point or printed pictures if desired)
- 2) Explain to students interesting facts about algae such as the role they play in marine ecosystems and the food chain
- 3) Showcase some of the products which students use or consume that contain algae
- 4) Introduce the concept of plant pressings and how scientists use them to preserve and describe different species.
- 5) Have students work in groups, size of the groups will be dependent on number of separate bowls with algae to create pressings
- 6) Give each student a piece of construction paper, cardstock or herbarium paper. Have them write their name on the side opposite of where they will place the algae upon
- 7) Have students select a piece of algae that will fit within the boundaries of their paper
- 8) Have students dry the algae with napkins before placing them on their sheet of paper
- 9) Direct students to place their pressings on pieces of cardboard
- 10) Cover the top of each group of pressings on cardboard with a sheet of wax paper. Stack all cardboard sheets with pressings and wax paper upon each other. Place a sheet of cardboard on the top and bottom of the stack
- 11) Place a heavy object such as a text book or brick upon the pressings (distribute weight of object evenly to ensure proper drying)
- 12) At the end of the lesson, the teacher could possibly have something derived from algae such as jello or ice cream for students to eat
- 13) Keep pressings in a well ventilated area for approximately one week to dry
- 14) Once pressings are dry, laminate them before giving back to students
- 15) Be creative, pressings can be used as a book mark, refrigerator magnet, or even framed as a picture

Education Standards

National Education Standards	Science: NS. K-4.1 Understanding about scientific inquiry Science: NS. K-4.3 The characteristics of organisms; Life cycles of organisms Science: NS. K-4.6 Types of resources Science: NS. 5-8.1 Science as Inquiry. Science: NS. 5-8.3 Structure and function in living systems; Populations and ecosystems
(Hawaii) Education Standards	Science: Life and Environmental Sciences: Organisms and the Environment: SC.3.4.1 Compare the structure of living things that help them to survive SC.3.5.1 Describe the relationship between structure and function in organisms SC.4.3.1 Explain how simple food chains and food webs can be traced back to plants SC.4.5.2 Describe the roles of various organisms in the same environment SC.5.3.1 Describe the cycle of energy among producers consumers, and decomposers SC.5.3.2 Describe the interdependent relationships among producers, consumers, and decomposers in an ecosystem in terms of the cycles of matter
Ocean Literacy Principles	Principle 4 (Grades 3-5): The ocean makes Earth habitable (b) Principle 5 (Grades 3-5): The ocean supports a great diversity of life and ecosystems (b.6, b.8)
Climate Literacy Principles	Principle 3: Life on Earth depends on, is shaped by, and affects climate. (e)

For More Information

Please visit the following websites to learn more about marine algae and algal pressings

<http://www.feedingminds.org/fmfh/fisheries-aquaculture/wonders-of-the-oceans/our-rich-oceans/lesson-3-algae/en/>

<http://www.coral-reef-info.com/coral-reef-plants.html>

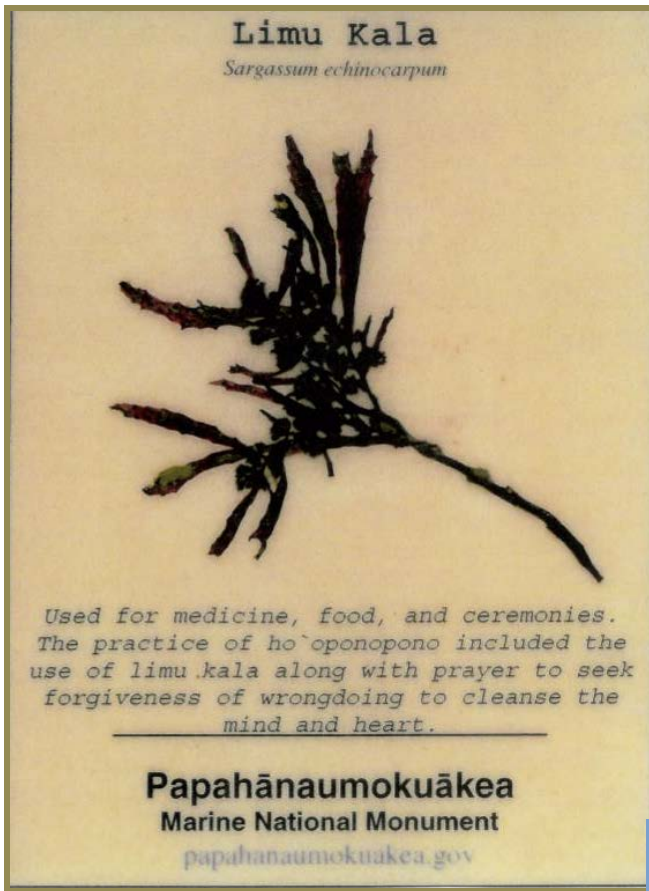
http://www.cryptogamicbotanycompany.com/lm_start.html

http://www.botany.hawaii.edu/BOT201/Algae/how_to_make_your_own_algal_herba.htm

<http://www.hawaii.edu/gk-12/evolution/pdfs/algae.uses.highschool.pdf>

http://www.reinat.com/lpmnm/benthic_reef_environment/designing_place_based_benthic_investigations/learning_about_limu/algae/fieldguide.pdf

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Example of a completed limu pressing (Templates provided upon request)



Students from Pāhoa elementary school creating limu pressings in the Moku pāpapa Discovery center wet lab

