Class Starters & Enders

Making the Most of Instructional Time
Five Minute Lessons

Class Starters and Enders help utilize the last minutes of class when a lesson ends but there is not enough time to start another, or for an interest approach at the beginning of class. Mini-lessons correlate to GPS in the programs areas below.

Food, Fertilizer, Fuel – The Versatility of Algae

Program Areas: Healthcare, Business, Marketing, and Agriculture

Instructions: Read the material and make notes of important points, answer questions, and be ready to discuss this topic.

Commercially cultivated algae can be grown in tubes like these in a variety of environments, including those where more common biofuel crops cannot grow.

You've probably seen algae in your pond, goldfish's bowl, or birdbath. If you like sushi, you've probably eaten algae too – in the form of seaweed. But algae are more than just pond scum or a key snack food ingredient. Algae are a large, diverse group of **autotrophic** organisms that are **photosynthetic** and **eukaryotic**. The most complex forms of algae are the seaweeds.

Algae are found all over the Earth, both on the ground and in the water. Some algae form **symbiotic relationships** with fungi, marine **invertebrates**, and sea sponges.

There are all sorts of uses for algae. Red algae are used to produce a gelatinous substance called **agar**, which is used in biology and biotechnology labs for different kinds of research. Seaweeds are often used as fertilizers, soil conditioners, and livestock feeds. Sewage can be treated with algae, reducing the need for toxic chemicals which perform that job. Algal pigments are also useful alternatives to chemical dyes and coloring agents.

As demonstrated with the sushi example, algae are popular foods, especially in Asian cultures. They are also eaten in Ireland, Scotland, Iceland, Greenland, Chile, Wales, Korea, North America, and New Zealand. Algae are good sources of vitamins A, B_1, B_2, B_6, niacin, and C. They are also rich in the minerals iodine, potassium, iron, magnesium, and calcium. Some commercially **cultivated** types of algae are even sold in stores as nutritional supplements. Algae are also high in **omega-3 fatty acids**.

Aside from powering our bodies, algae might soon also be powering our cars. Algae fuel is a **biofuel** derived from algae, and some scientists believe using algae fuel will eliminate the introduction of new **carbon dioxide** into the atmosphere. The fuel can be produced using ocean and waste water, and it is also biodegradable. Algae fuel can be turned into **biodiesel**, **biobutanol**, **biogasoline** and even jet fuel. It can also be broken down into methane and ethanol.

Unlike corn, another crop used to produce ethanol, algae can be harvested every few days, and with specialized containers can be grown in areas where traditional crops cannot. However, because algae fuel is a recent development, producers and scientists are running into problems finding the right amount of nutrients to feed large amounts of algae. Wastewater is a possible nutrient source but must first be processed by bacteria. There are also uncertainties regarding the **economic viability** of commercially producing the organism.

Review

1. Algae are what type of organism?
2. What do algae form symbiotic relationships with?
3. List three uses for algae.
4. People in which countries eat algae?
5. What nutrients are algae considered good sources of?
6. What types of fuel can algae be used to produce?
7. What concerns do scientists have about algae fuel?

Language Connection

Define the following terms.

Agar	Biogasoline	Invertebrates
Autotrophic	Carbon Dioxide	Omega-3 Fatty Acids
Biobutanol	Cultivated	Photosynthetic
Biodiesel	Economic Viability	Symbiotic Relationships
Biofuel	Eukaryotic	

Georgia CTAE Resource Network - Written by Sarah Jean Dover, Dallas Duncan, and Dr. Frank B. Flanders, Ed.D.