UNH Scientist Explores Seaweed Aquaculture

Cultivation Could Be Lucrative Business for New England Growers

By Sharon Keeler
UNH News Bureau

DURHAM, N.H. -- Great progress has been made over the past couple of years in the scientific community and commercial sector to develop ways to farm the sea. Aquaculture, borne out of necessity to save depleting fish stocks, and a desire to sustain natural resources, looks to be a burgeoning industry in the new millennium.

Scientists at the University of New Hampshire, like geneticist Anita Klein, are at the forefront of discovery in this field. In her laboratory at Rudman Hall, Klein and her students are studying seaweed. They are collaborating with a group of New England scientists to measure the diversity of North Atlantic red algae, called *Porphyra*. This marine plant, which grows in rocky intertidal habitats along the New England coast and in estuarine areas, is deep red to greenish-brown in color.

The Japanese species of *Porphyra* is cultivated to make nori, the seaweed wrapper used for sushi. Japan is the principle consumer of nori, and the major exporter to the United States, capitalizing on a $2 billion industry it shares with Korea and China. According to Klein, cultivating this marine plant for local sale and export could be a lucrative business for New England growers.

"Our overall goal is to be able to adapt local species for seaweed aquaculture," she says. While seaweed is harvested for commercial applications -- to produce agar for the medical industry, for example -- it has not been grown successfully in the United States through aquaculture. A major Porphyra venture in Eastport, Maine, was unsuccessful because it used a non-native species that did not adapt well. Scientists believe that local New England *Porphyrae* have great potential for nori aquaculture, but they have little baseline

information about the different species.

Klein is working with fellow UNH researchers Art Mathieson and Chris Neefus to better understand the native *Porphyra* species. This involves both genetic studies to determine identifying markers, and field ecology studies to learn which species thrive in various types of environmental conditions. Salinity, temperature, availability of nutrients, currents and wave activity all play a part in determining where a *Porphyra* species decides to take up residence.

Klein and her students are looking for better genetic markers to distinguish each of the six native New England species. Because *Porphyra* species look similar, descriptive characteristics like thickness, color or shape do not reliably distinguish one from another.

In Klein's laboratory, sophisticated scientific techniques are used to decode the genetic fingerprint of each *Porphyra* species. DNA fragments are separated in an electric field on a gel that produces distinct banding patterns for each. These sequences are then used to identify similar samples, or to categorize those that are different.

"This type of work is most important to commercialization of native *Porphyra* species," says Klein. "Once you can accurately identify a certain species you can pair it with its bioecological characteristics. What does it need to thrive, in terms of water temperature, nutrients and salinity? People will need this type of information as they make decisions about whether it's economically feasible to grow *Porphyra*."

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