

## Seaweed workshop notes (C. Schmitt) 30 August 2012

Dr. Charles Yarish, UCONN

Dr. Yarish reviewed some of the global-scale details on seaweeds; about a \$6 billion USD industry, for food, pharmaceuticals, animal feeds, fuels, etc. Largest producers are in Asia and Chile, with largest consumption in Asia as well. There is a variety of red, green and brown algae being cultured, and he covered the complex life cycle of marine macroalgae as well. Each species of seaweed has its own complex life cycle, but they all involve a microstage that can be manipulated in a laboratory to produce young fronds, “seeded” onto a line or net for outplanting into the sea.

He usually refers to them as sea vegetables, which many others in the industry do as well, to give consumers and the public a better sense than using ‘seaweed.’ For prospective growers, there are several challenges to growing sea vegetables—have to culture in a laboratory, get wild plants to reproduce and grow. Then have to get them out of the lab and into the field, which means growers will need an aquaculture lease, and that growers will need to know something about the site conditions (eg, if you are growing a seaweed that requires high nutrient levels), then have to harvest and process it. Processing can be quite a job; in some cases as simple as air drying, but otherwise can be complex - some of the same machines involved in making paper can be used to make nori sheets.

One area of great interest is remediation; marine plants can remove nitrogen, phosphorus and other pollutants quite effectively. For example, in siting a Gracillaria farm in New York City coastal waters, just off the Fulton fish market, where the East and Bronx rivers meet. There are ideal conditions—low light, high nutrients. The algae coming out of that system could not be used for food, but could be used as fuel, and we can use these techniques to take nutrients out of the water in urban areas where nitrogen is a problem. For example, a little rough math shows that 69,400 tons of seaweed at 5% nitrogen would equal about 32 million dollars in remediation value (roughly \$460 per ton), since companies have to pay for their discharges.... ecosystem services is an application that represents a new opportunity.

Careful to note that he only advocates native species and using seed stock from local waters.

*Question about how to respond to concerns about proliferation of seaweed in area that you are culturing.*

*-C. Yarish: emphasized the importance of using local seed stock for culture in an area to avoid any concerns about non native transplants in an area.*

*-S. Redmond: When culturing kelp, you will harvest the plants before they become reproductive, so your plants will not “seed” the area you are culturing. There are plenty of wild kelp beds in the Gulf of Maine that will be constantly sending out spores in an area naturally.*

Tollef Olson

Tollef reviewed the process for producing his products; from generating the juvenile plants in the hatchery, to seeding the farm, to harvesting and product development. Field growout is a winter activity for sugar kelp, usually November through May, and plants can grow upward of an inch per day, during the mid and late winter months. **6-8 pounds of seaweed per line of growout is not unusual.**

His company recognizes that one problem is competition from overseas — they have to separate themselves in the market by creating new products, especially ones that place kelp in the category of “mild green vegetable.” Fortunately, many of the other products are processed and preserved, such as seaweed salad that originates from Asia, whereas his products are fresh or frozen, and minimally processed.

We also will never be able to produce on the same scale as in Asia—for example, in China, farms are so close together they actually have to add nutrients to the water to keep the plants growing. Maine farms will need to be strategically spread out in targeted areas.

Ocean Approved works hard in the education and product development area; often they go together. Working with Johnson and Wales culinary students helps them get the word out about their products, and helps them think about new items that chefs and consumers might want. Being able to harvest the whole plant - stipe and all - allows them some freedom in the product development area that wild harvesters might not have.

*Question for DMR - adding seaweed to an existing shellfish lease will likely require an amendment to lease*

Sarah Redmond, Dana Morse

Sarah reviewed a recent project funded by the Maine Aquaculture Innovation Center; sugar kelp was grown on 7 shellfish farms around the state. Most of the sites were mussel farms, but one oyster farm was included too. The project had to start late, with seeding in December and January, and that pushed the whole schedule back, but growth on several sites was good, with good plant densities. Plants ultimately were too small for good use in the market for dried kelp, but this was an effect of having to start the project late. Some product was dried and sold at a farmers market; roughly 50 bags of 2 ounces each were sold for \$8 apiece; the remainder was used as fertilizer and food for urchin aquaculture experiments. The team will try again in 2012-2013 with a more appropriate schedule of seeding and harvesting, and part of that work will be to help growers and buyers figure out the best scheme for bringing the raw product to market. The economics of course will be critical to understand better so that growers can evaluate the profitability of this kind of work. Sarah notes that the key is to use the Maine brand—it is our source of power, and what distinguishes us from others. The other major change for the

upcoming work is to avoid growing the kelp under mussel rafts; it's too shaded and with flows that are too slow. The next experiment will continue to grow kelp in between mussel rafts, or on longlines as used by Ocean Approved and Dr. Yarish's lab. Sarah put together a video on the project that will eventually be posted to the web.

#### Sarah Redmond - Products and Processes

Sarah's presentation covered a huge range of products that either are currently made with seaweed ingredients, to some products that don't exist yet but which might have a place in the market.

Most of the seaweed cultured globally comes from China, Korea, and Japan. Maine has a few wild harvest based seaweed companies, and the first kelp farms in the United States. The new types of kelp products possible with cultured kelp include fresh, salted, ready-to-eat, dried, frozen, and snack and convenience foods. In order to move the cultured kelp into existing markets, plants need to be comparable in size, thickness, and quality with the currently utilized wild harvested plants. There is an opportunity for the development of new types of products, however, and Maine has food science and new product development resources at the University of Maine and through USDA and FSA grants.

Other possible products include seasonings, healthy food supplementation, snacks, pet and livestock feed supplementation or treats, live and feed markets for aquaria, fertilizers, skin and beauty products, thalassotherapy (spas and seaweed baths), and health supplements.

#### *Questions about organic certification*

*Questions about regulations for naming/labeling (eg, Ascophyllum labelled as kelp).*

*--Check your labels. Both rockweed and kelp are called "kelp". Rockweed is either Ascophyllum or Fucus species, and Kelp can be Saccharina latissima (sugar kelp or kombu), Laminaria digitata (horsetail kelp or kombu), or Alaria esculenta (winged kelp or Atlantic wakame).*

*Questions for Quebecois—mostly about lab and culture processes, molecular/chemical work, mannitol content, etc.*

#### Wrap-up discussion

The end discussion was fairly brief, we'd gone over in some of the presentations and had started a bit late, so it was about 20 minutes of discussion at the end of the day.

One clear area of interest was the need to educate consumers and the interested public on the nutritional value of various marine plants; this would increase the demand, but currently, people outside of the health food industry don't know. There is a great story to tell here.

Related to this, we need to educate students, and should start in the schools re: food products. Seaweed can be within either the seafood or the healthy vegetable

realm—need to promote overall the healthy local foods available from the sea. Many of the schools are already trying to incorporate local foods, though one person noted that in the recent 4H science fair in Bangor, there was no marine science represented - 4H might provide an excellent avenue for reaching students. UMCE, ME SG, and ARI have just started working on aq videos, and are expected to do more - these are targeted to 4H, and seaweed would fit in nicely.

Sea vegetables need a festival—or to incorporate seaweed into other summer seafood festivals; lots of good opportunities here.

The Food Science group at UM could be a good partner, both to conduct research of interest to industry and to involve students in projects; overall, we need more students involved in this whole scene. ARI pointed out the recent aquaponics workshop for teachers in inland schools.

We can refer people to the information already on line at several industry sites; not just about their products, but about the plants, ecology, and health benefits.

Regarding networking people at the meeting together, and beginning to increase that to others in the region, there was interest in web-based material and in an on-line list serve. ME SG staff will be working on the list serve, web material and potentially a Facebook pages, although not everyone will use each of these mechanisms. The outcomes from this meeting will be posted on the ME SG website for future reference.

Overall, there was strong interest to make connections, get people working together, and to create lists of available resources (UM food science group for example, and etc.) At some point, it may make sense to have breakouts/working groups that cover the spectrum of who is here today—production, commercial fishermen, marketing and products, pharmaceuticals, etc., that way, people who have some specialization in one area can have a more focused discussion. In addition, a Seaweed Working Group came up as a possible approach, modeled after the Shellfish Working Group.

There was some great discussion about cooperatives for large machinery that might be needed for preserving, processing, etc. The capital investment is too much for one person; and all the aquaculture companies in Maine are small, but they all need the same types of equipment and machinery. The shared use center in Belfast came up as one potential resource for bringing product to market and working on new products, also Crown of Maine/Northern Girls processing (putting seaweed in empty trucks going up to pick up food, for example). Currently, some seafood folks already collaborate with dealers to get products where they need to go, so there's a working template.