TESTIMONY OF
CHARLES YARISH
PROFESSOR
UNIVERSITY OF CONNECTICUT
BEFORE THE
ENVIRONMENTAL COMMITTEE
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My name is Charles Yarish and I joined the faculty at the University of Connecticut ("UConn") in 1976. I have since developed an internationally acclaimed laboratory for seaweed research in the Department of Ecology and Evolutionary Biology and Marine Sciences at the Stamford Campus of UConn. My work has been funded by the State of Connecticut and numerous federal grants. My research is well published, including co-edited books entitled, "Economically Important Marine Plants of the Atlantic: Their Biology and Cultivation" and "Seaweeds - Their Environment, Biogeography, and Ecophysiology." I am now co-editing a research volume, "Long Island Sound: Prospects for the Urban Sea", on the state of the Long Island Sound, which will be published this year. Currently, I am one of the advisors of UConn's International Business Accelerator team.

Thank you for this opportunity to comment on:

House Bill No. 6318: AN ACT CONCERNING THE CULTIVATION OF SEAWEED
Dr. Charles Yarish supports this Bill.

UConn has spearheaded the seaweed research for seaweed propagation and cultivation which would make the fruits of this legislation highly successful. UConn has established nursery systems for a summer crop seaweed, the native red alga (known as sea asparagus), *Gracilaria tikvahiae*; and a winter crop species, the native brown alga (known as sugar kelp), *Saccharina latissima*, in its labs. HB 6318 will enable UConn to continue in its efforts to expand the cultivation of these and other potentially economically important seaweeds for its ecosystem services (nutrient bioextraction and habitat improvement), sea vegetables, fertilizers, animal feeds, hydrocolloids, cosmeceuticals, nutraceuticals and biofuels.

UConn has worked closely with the Bridgeport Regional Aquaculture Science and Technology Education Center (BRASTEC), and Ocean Approved, LLC (Portland, Maine), the first commercial kelp company in the United States. The BRASTEC students and staff have assisted UConn with the analyses of the seaweed biomass in the laboratory and at the farm site. Additionally, BRASTEC staff and students, and Ocean Approved, LLC., have assisted UConn in the processing of the harvested kelp in their food processing facilities.

During the 2011 – 2012 growing season (December – early May), UConn, with the assistance of BRASTEC, grew kelp on approximately 150 meters of longline at their Fairfield farm site and produced up to 18 kg m^{-1} of longline. UConn has already tested the harvested kelp for various potential uses such as fertilizer, animal feeds, and biofuels. UConn and its collaborators are in the process of establishing a sea vegetable processing facility for human consumption (e.g. kelp noodles and sea vegetable salad from sea asparagus) at

BRASTEC. Currently, 50 pounds of high-quality vacuum-packed kelp pasta noodles are being stored in a freezer waiting for an approval for sale. In addition, 22 pounds of fresh sea asparagus is being grown under tightly controlled environmental conditions for a fresh sea vegetable. This product is also awaiting approval for sale.

During the 2012 – 2013 growing season, UConn has outplanted kelp seedstring at two open water seaweed farms in Connecticut (off Fairfield and Thimble Islands), and additional open water farm sites in New York, Rhode Island and Massachusetts. These are the only farm sites permitted for seaweed cultivation in Southern New England during this growing season. The total length of longline is approximately 800 meters. For kelp, UConn can presently produce up to 6000m of seedstring, which is sufficient for the current Southern New England kelp seedstock demand.

As for *Gracilaria*, UConn has various scales of nursery culture systems, which are up to six 4,000 liter tanks. The production from UConn's *Gracilaria* nursery can either be sold directly to consumers (e.g. restaurant or other consumers) or the seed stock can be provided for open water cultivation for nutrient bioextraction and other uses of the biomass.

UConn and its collaborators have proved that seaweed aquaculture can provide significant ecosystem services by removing inorganic nutrients from urbanized coastal waters (e.g. LIS, NYC estuaries). Based on their seaweed farming findings from the past two years in LIS and the Bronx River estuary, UConn estimates that *Gracilaria* can remove up to 5.5 kg of nitrogen (N) per hectare of seaweed farm per month in LIS and approximately 10.3 kg of N per hectare in the Bronx River estuary. Sugar kelp can remove up to 87 kg of N per hectacre during its winter-spring growing season (December – late April).

Manuals for further purview:
UConn-developed protocols/manuals and companion DVD video for operation and maintenance of nursery systems (http://digitalcommons.uconn.edu/cgi/siteview.cgi/wracklines/72; http://digitalcommons.uconn.edu/wracklines/71/; http://seagrant.uconn.edu/publications/aquaculture/).

This material is open source and freely available to interested aquaculture operations and educational institutions.

Sugar kelp seedstring deployment (December 2011, LIS; left). Sugar kelp harvest (May 2012, LIS; middle and right)

Gracilaria harvest (July 2012, Bronx River estuary, 17 days since deployment; left). *Gracilaria* bundles, initial size outplanted (right in the photo) and after 17 days of growth (Bronx River estuary; left in the photo)