Woods Hole Oceanographic Institution

Biology Department Seminar

Thursday, May 23, 2024 – 12:00 Noon

Selectively Breeding Heat-Tolerant Sugar Kelp for Resilient Aquaculture

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Warming sea temperatures are threatening global kelp populations, including sugar kelp (*Saccharina latissima*), one of the most commonly farmed kelp species. For the future of kelp aquaculture and restoration, we need to identify individuals with natural adaptations to cope with heat. If heat tolerance of adult kelp (sporophytes) can be predicted by assessment at the early-life stage prior to fertilization (gametophytes), then we can accelerate breeding of heat tolerant strains and identification of the genes involved. To investigate this, we developed a high-throughput method for assessing sugar kelp gametophyte physiological stress under heat and conducted an experiment to generate predictions of heat-tolerant strains. Gametophyte heat tolerance was assessed for 93 distinct genotypes by exposing them to temperatures representing current (12^{o}C) and future (24^{o}C) average annual temperatures in the Gulf of Maine, U.S.A., and measuring their photosynthetic performance (as chlorophyll a fluorescence). We then conducted a heat stress experiment with juvenile sporophytes made by crossing male and female suspected heat-tolerant gametophytes, and male and female suspected intolerant gametophytes. The juvenile sporophytes from 7 unique crosses were exposed to control (12^{o}C) and warm (up to 22^{o}C) temperatures, and we monitored their growth and condition over time. Our results indicate that we can identify heat-tolerant gametophytes that, when crossed, yield juvenile sporophytes that had greater growth under heat stress than sporophyte progeny of predicted intolerant gametophytes. These results are promising for future selective breeding of sugar kelp toward resilient aquaculture.

HYBRID! **In Person**: Redfield Auditorium **Zoom:** https://whoi-edu.zoom.us/j/97000865816 Meeting ID: 970 0086 5816 **By phone**: Find your local number: https://whoi-edu.zoom.us/u/adIvMow3LQ