U.S. DEPARTMENT OF ENERGY AlgaePrize NextGen Algal Innovators

Team Name:

Kelp! I Need Some Algae

Team Schools/Organizations:

University of Alaska Fairbanks

Abstract:

Although the commercial seaweed mariculture, or marine aquaculture, industry in the United States is continuing to change and grow, the methodology of commercial hatchery operations and materials used to seed the farm remain unmodified. The previously established methods and materials used are region specific, therefore finding cost effective solutions for domestic production will not only reduce farmer waste and expense but will also allow for international competitive pricing.

Sugar kelp (Saccharina latissima, Laminariales, Phaeophyceae) has been the focus of several studies investigating hatchery and farm performance in both Alaska and the east coast of the continental U.S. S. latissima demonstrates substantial potential in many commercial applications as shown by the varied and successful products created by established kelp farms. We chose S latissima for this study because of its prominence in domestic mariculture and the potential for immediate and widespread application of our results.

The most commonly used material for seed string is a vinylon string called Cremona, or kuremona. Vinylon is a petroleum-based nylon blend, and the durability of the string means it must be removed at the end of the season after harvest, creating a substantial volume of synthetic waste in local landfills while risking introduction of microplastics into both the marine and terrestrial environments. It has also been observed that tangling of the string during harvest can result in delayed operations and loss of material as the string “unzips” the delicate Saccharina holdfasts.

Identifying a natural fiber that is inexpensive and easily acquired that degrades in the water will decrease expense and labor to farmers and synthetic waste in the ocean and landfills. We propose to test several alternative natural fibers in comparison with the

standard Cremona/kuremona in both the lab and in the field and will measure growth rates and final yield.

Fertilizers vary from hatchery to hatchery, with f/2 media and Provasoli's Enriched Sea water with Iodine (PESI) being commonly used. While f/2 media can be purchased, PESI is tailored for cultivation of seaweeds but must be made in-lab; a time consuming, expensive, and laborious process. The f/2 media is designed for coastal marine algae growth, including diatoms and other potentially epiphytic species which can contaminate kelp cultures.

Identifying an inexpensive, readily available fertilizer solution that targets Phaeophyceae growth without extraneous nutrients may help reduce epiphytic growth and improve hatchery performance. Jack's Special 25-5-15 plant fertilizer is a readily available and cheap fertilizer that has shown potential in commercial seaweed applications. We propose to utilize a combination of Jack's Special 25-5-15 plant fertilizer paired with the FeEDTA solution from PESI. We will test its viability as a potential alternative to PESI in the lab and in the field by measuring growth rates as well as final yield.

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