Overcoming the bivalve hatchery algae bottleneck with algae concentrates

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The need for large quantities of quality microalgae is one of the most significant impediments restricting expansion of hatchery capacity for the bivalve industry. Ample feeding with microalgae is essential for hatchery productivity, but natural phytoplankton from ambient waters cannot provide a reliable supply of microalgae. Moreover, untreated seawater risks exposure of hatchery animals to parasites, pathogens, and toxic phytoplankton blooms.

Crassostrea virginica- veliger larva

Adequate feeding with high-quality algae is the key to both high growth rates and survival. But production of sufficient quantities of algae to satisfy the needs of a hatchery can be a daunting challenge, especially for smaller growers who are now faced with the need to establish their own hatcheries due to shortages of seed.

Fortunately, there is a solution to the problem of ensuring reliable supplies of microalgae for hatcheries: the use of liquid algae concentrates. Reed Mariculture Inc. produces algae concentrate feeds designed specifically for bivalves. Reed Mariculture's Shellfish Diet® 1800 provides a nutritionally balanced combination of six specially-selected strains of *Chaetoceros*, *Pavlova*, *Tisochrysis* ("T-Iso"), *Tetraselmis,* and *Thalassiosira*, providing a range of cell sizes from 4 – 12 microns. These marine microalgae strains have demonstrated success as feeds for a variety of bivalves including oysters, clams, mussels, and scallops. This mixed diet provides excellent nutrition

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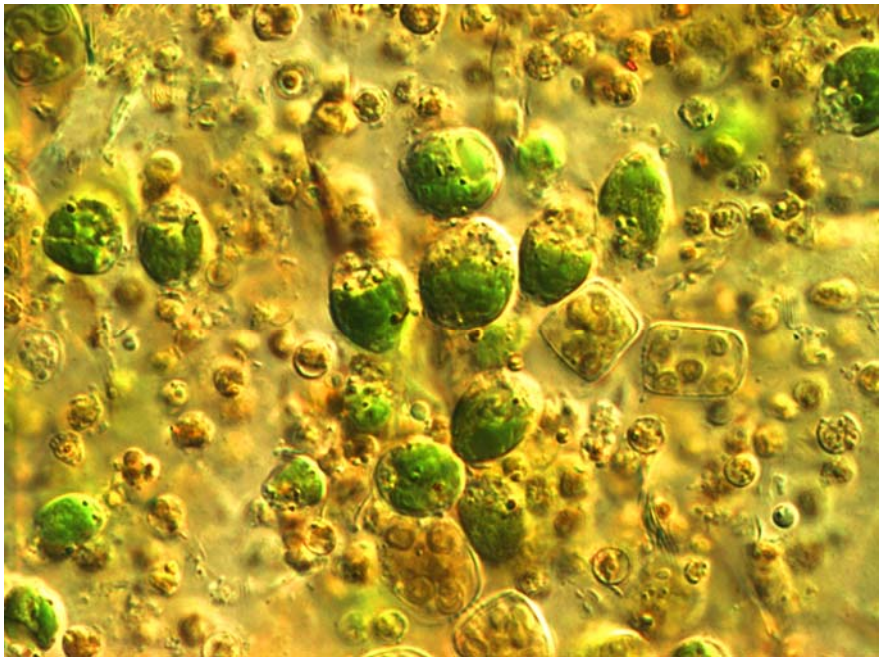
for all life stages, from larviculture and spat setting in the hatchery, or for remote setting, all the way through to broodstock conditioning. Reed Mariculture also offers the algae species used in Shellfish Diet as single-species Instant Algae® products, so hatchery operators have the option to create their own custom mix of species for particular applications.

The FAO bivalve hatchery manual estimates that "The culture of algae accounts for about 40% of the costs of rearing bivalve seed to a shell length of about 5 mm in a hatchery." Many bivalve hatcheries are now finding it more economical as well as more reliable to feed only with Instant Algae. With no need to grow their own microalgae, the cost and the complexity of both constructing and running a hatchery are significantly reduced, making it possible for even small-scale bivalve growers to set up their own hatcheries. For established hatcheries, use of Instant Algae to supplement in-house algae cultures can avert critical shortages when peak demand outstrips production capacity.



Micrograph of Shellfish Diet

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In the USA, Scott Rikard manages the Auburn University oyster (*Crassostrea virginica*) hatchery on Dauphin Island, Alabama. He says, "We use Shellfish Diet almost exclusively for rearing our oyster larvae. Since we opened the hatchery in 2003, production has increased from a few million larvae and less than 100,000 oyster spat each year, to 188 million oyster larvae and 12.8 million oyster seed in 2014. All made possible by Shellfish Diet!" (see www.nsgl.gso.uri.edu/masgc/masgcg12008.pdf)

John "Barley" Dunn, Director of the East Hampton Shellfish Hatchery on Long Island, in the state of New York, says "We use Reed's algae concentrates to supplement our own live algae production during the times of year when our shellfish are 'eating us out of house and home.' This allows us to grow more and larger shellfish early in the season before moving them to the nursery."

Reed Mariculture produces algae from continuously-harvested cultures, so the algae are always in their healthiest, rapid-growth phase. After harvesting by centrifuge, the algal cells are re-suspended in a proprietary medium of buffer salts, to stabilize cell integrity and retain full nutritional value. No pasteurization or other heat treatments are used. Shellfish Diet is a refrigerated product with a shelf life of 12-14 weeks. According to the FAO *Manual on The Production and Use of Live Food for Aquaculture*, "The density of harvested algal cultures generally ranges between 80 and 250 mg of dry weight per liter." The biomass dry weight of Shellfish Diet 1800 is 8% (80

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g per liter), so one liter of Shellfish Diet is typically the equivalent of 320 to 1,000 liters of algal culture. In contrast to algae cultures, the consistent biomass densities of Instant Algae products make them particularly well-suited for automated dispensing to larviculture tanks via a dosing pump.

Because the algae cells in Reed Mariculture's Instant Algae products are so highly concentrated, some care is required when dispensing the products into culture tanks. This extremely high concentration can sometimes result in clumping if the product is added directly to seawater without sufficient mixing. This may happen because the cells are in such close contact that if polysaccharides on the cell surface interact with calcium ions naturally present in seawater, cells can stick together. It is therefore best to first dilute Instant Algae into around 10 volumes of fresh water (which must be free of calcium or iron, which can also cause clumping), or even better a sodium chloride solution. Pouring the diluted product through a 20 micron screen will further ensure complete dispersion of the algal cells.

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About Reed MAriculture

Reed Mariculture Inc. was founded in 1995 by the Reed family to grow "tank-raised" bivalve shellfish. Over the next three years they worked on developing tank-raised shellfish technology, while also developing and refining the technology for large-scale production of marine microalgae, the essential feed for shellfish. In 1998 Reed Mariculture discontinued its shellfish operations to focus on producing microalgae for shellfish and finfish hatcheries. Today the company markets its algae-based feeds to aquaculture research institutions and commercial hatcheries in 86 countries.

More information

Please visit www.reedmariculture.com for more information about Reed Mariculture products.