

Aquacultural Ecology of Hatchery-Produced Juvenile Bay

Mussels, Mytilus edulis L.

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By

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Ecology

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Abstract

Hatcheries offer a realistic approach to solving many of the problems that constrain the mussel (Mytilus edulis) culture industry in the U.S. and elsewhere. But for this approach to be economically viable, growers need to be able to effectively use very small (1 mm), recently metamorphosed, and thus inexpensive spat. However, the ecology of these transplanted spat has received very little attention and previous attempts at using these spat have often failed. Therefore the purpose of this dissertation was to identify the major causes of mortality of recently planted spat and to analyze how management variables, such as planting season, initial density, and substratum type, affect production.

As a prerequisite to this study, a method was developed to reliably metamorphose Mytilus edulis larvae in the hatchery. This was achieved by using a downwelling system which is described. In addition, the spat so produced had to be tagged so that they could be distinguished from wild spat. A tagging method is described based on the finding that shell pigmentation was controlled by light intensity.

Field caging experiments using these tagged spat in Tomales Bay, CA showed that the seasonal pattern of inshore migration and reproduction of small surfperch, chiefly Cymatogaster aggregata, caused a seasonal pattern of high summertime mortality. This could be avoided by excluding the fish with netting (11 mm mesh diameter). A size refuge against these predators was reached at 11 mm. The flat-worm, Notoplana inquieta, was also found to be an important predator. It could be eradicated using a 3 minute fresh-water dip.

Mortality, fouling, and growth were found to be strongly density dependent. The highest yield was attained by planting at low density ($2/\text{cm}^2$) in the month of March when fouling was light.

Large scale crops could be successfully started by remote setting of the spat in tanks of static, unaerated seawater at ambient temperature. In some cases, the seeded substrata could be removed from the tank after as little as 1.5 hr. Rubberized, curled hair packing material with a backing of scour pad was a good substratum, providing a protective, easily seeded habitat for the spat.

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