

UNEXPLAINED MORTALITIES OF HATCHERY-REARED, JUVENILE OYSTERS, *CRASSOSTREA VIRGINICA* (GMELIN)

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ABSTRACT Survival, growth and pathology of juvenile oysters, *Crassostrea virginica*, in off-bottom culture at Oyster Bay and Fishers Island, New York, were monitored during the summer of 1991 to document and help explain the episodic mass mortalities of cultured seed oysters that have occurred in the northeastern USA over the past several years. At Oyster Bay, where the more detailed study was conducted, 54 to 75% losses affected several 1991 cohorts at mean shell heights ranging from 15 to 24 mm, within 3 to 62 weeks of transfer from the hatchery to growout trays. Mortalities occurred in July and August, at temperatures between 22 and 25°C, and were reduced significantly at low stocking densities. Deaths were associated with reduced tissue and shell growth, reduced condition index, mantle retraction, the deposition of an abnormal conchiolin layer on the inner shell, and lesions of the mantle surface. No obvious pathogen was identified in soft tissues or shells by light or electron microscopy. The pathology suggested that a toxin-producing agent of bacterial or microalgal origin, or chemical contaminant, caused mantle retraction and secretion of anomalous conchiolin as a defense mechanism. Two potential agents were recognized. Bacteria were found in mantle lesions and within the abnormal conchiolin sheet, but not consistently and with <30% prevalence; it is not clear whether these were primary or secondary invaders. Blooms of a large dinoflagellate, *Gymnodinium sanguineum*, occurred at peak densities of 5×10^6 cells l⁻¹ at the time of initial oyster mortalities, although the species is not known to be toxic to bivalves. Follow up studies are planned to identify the etiological agent and culture methods that minimize losses.

KEY WORDS: *Crassostrea virginica*, juvenile oysters, mortalities

INTRODUCTION

Heavy, unexplained mortalities of hatchery-reared, juvenile oysters, *Crassostrea virginica*, have been documented since 1988 by commercial growers in the northeastern U.S. (Rask 1990, 1992; Relyea 1992), and constitute one of the major impediments to the expansion of AQUACULTURE oyster production in this region. Losses typically occur during early field growout of off-bottom cultures. Before 1991, oyster mortalities were observed in the Damariscotta River, ME (>90% losses in 1988, and 40 to 90% losses in 1989); at several sites in MA in 1989 [Orleans (>95% losses), Nantucket (80% loss), and Essex]; in Oyster Bay, Long

Island, NY (50% mortalities in 1990), and West Harbor, Fishers Island, NY (1988 through 1990) (authors' 1992 survey). No mortality episodes were documented in Maine or Massachusetts in 1990, but these recurred in the Damariscotta River in 1991.

Juvenile oyster mortalities have thus been widespread and recurrent, but may not be related to a common cause. Some common features were described, however, at most of these sites: 1) mortalities generally occurred during the summer (primarily in July–August) after a period of sustained growth; 2) losses were highly age/size specific, preferentially affecting first-year oysters, at a size of about 6 to 30 mm; 3) mortalities occurred in surface trays or suspended culture, not in bottom plantings; 4) affected oysters