



Woods Hole Oceanographic Institution Sea Grant Program
Cape Cod Cooperative Extension



Managing Quahog Parasite Unknown (QPX) Disease

Introduction

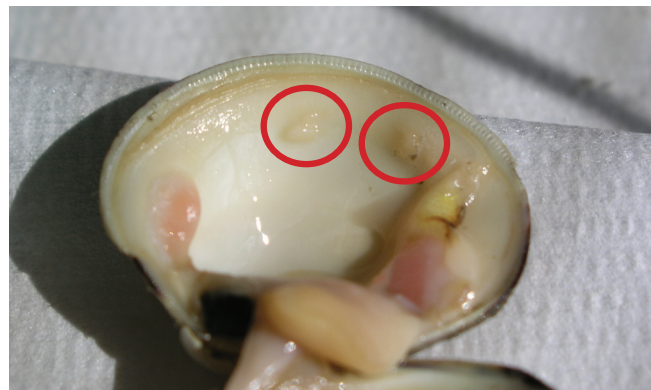
Quahog (*Mercenaria mercenaria*, also known as the hard shell clam) farmers strive to produce a premium product, while maximizing growth and survival. Like oyster farmers, quahog farmers can face the challenge of disease. In particular, Quahog Parasite Unknown (QPX), a single-celled, protistan parasite, has been found in a number of growing areas and can cause slow growth and massive mortality of quahogs, in some cases killing more than 90 percent of the crop. (Notably, while the disease can devastate quahogs, it is **not** a threat to human health.)

In this bulletin, we describe techniques and culture methods to address the challenge of QPX.

Know What to Look For

QPX is directly infective and can spread quickly in a population. Once a sick quahog dies, QPX organisms are released into the water, often infecting adjacent animals. Mortality, though, is often spread out over a number of months. Often the first indication of QPX to a farmer is dying quahogs, well after the disease has become established and spread.

Regularly check your crop. Early signs of QPX may include poor growth, shell chipping, and animals out of the sediment and not reburying. If you observe any of these signs, open some animals and look at the tissues; infected quahogs may have swollen mantle tissue, pulled back from the shell margin as well as white to yellowish tan nodules.



Infected quahog (*Mercenaria mercenaria*) showing characteristic nodules along the mantle (circled in red).

If you are concerned that your quahogs may be infected, we strongly recommend having the crop tested. Private companies and often universities can provide diagnostic services. If you are unsure where to go, contact your local extension agent.

Prevention

The first and strongest line of defense for a quahog farmer is to prevent the spread of infection among or even **within** water bodies (e.g., between growing areas). Seed should not be moved without proper approval from permitting authorities, which includes a formal disease examination by a trained pathologist. Farmers should also not accept seed from any areas identified as QPX-infected regions. While seed directly from hatcheries has never been documented as diseased, caution should be exercised when purchasing field-planted seed. Purchasers should ask for documentation that these seed are QPX-free.

In water bodies considered uninfected, if infected quahogs are identified early and confined to particular plantings, rapid removal and disposal of the entire planting should be considered to protect the remainder of your crop, as well as those of your neighbors. Infected or possibly infected quahogs should be disposed of on land (e.g., a waste disposal facility). While costly and time-consuming, this approach may prevent the establishment of QPX in new growing areas, preventing long-term losses.

Manage the Disease

In many cases, QPX appears to be established and persisting in areas where quahogs are grown. Most shellfish farmers, however, cannot relocate their farm! What can these farmers do to stay in business?

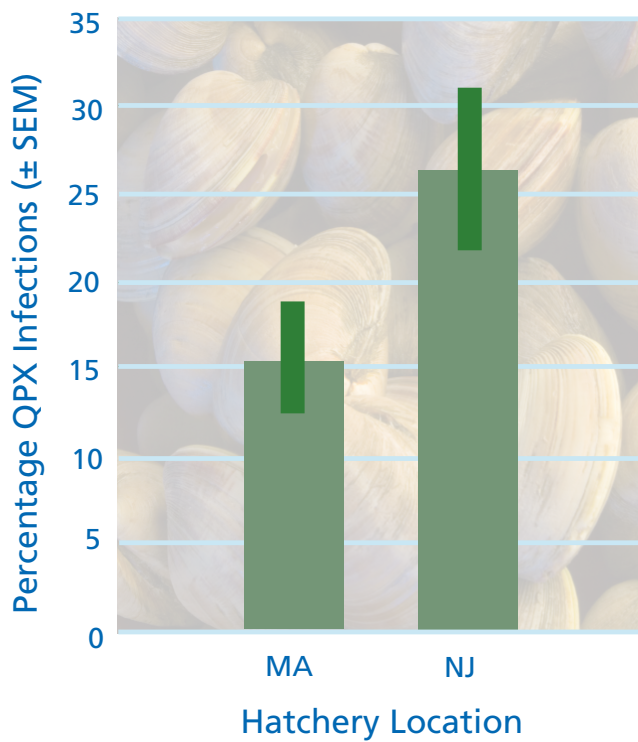


In an apparently successful effort to stop the spread of QPX, quahog farmers in Wellfleet removed infected clams to protect the remaining clams.

Letting an infected bed go fallow for one to two years or rotating another crop (e.g., oysters) is often recommended as a means of letting the QPX organism abate. Anecdotally, this does seem to improve subsequent survival until QPX builds back up.

Importantly, there are strong differences in the resistance to QPX by different strains of quahogs. Numerous studies have documented that quahogs moved to cooler climes do not fare as well as locally bred quahogs. Further research is being done to determine if this is a genetic

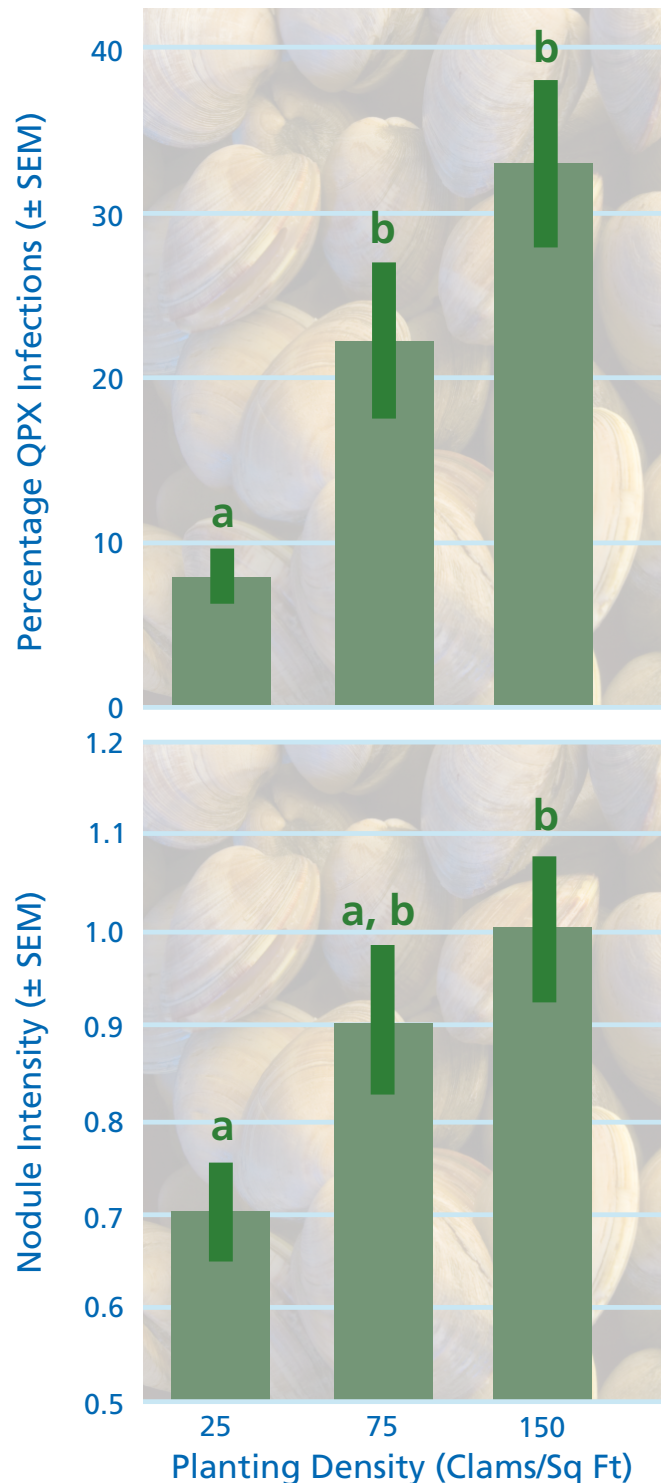




Prevalence of QPX in quahogs planted in Barnstable Harbor after 27 months varied significantly between clams from a local Massachusetts hatchery (MA) and a more southerly based hatchery in New Jersey (NJ). Standard error bars are shown.


difference or due to different acclimation histories. At this point, though, it is recommended that you contact your local extension agent to determine what strain appears to do best in your region.

Additionally, density of planting has long been suspected of affecting the spread and intensity of QPX. Based on recent work in Barnstable Harbor (MA), it appears that quahogs should be planted at a density of less than 75 animals/ft². Quahogs planted under this density were at lower risk of catching QPX and showed fewer nodules. It should be stressed, however, that survival of quahogs at even the lowest density was below 30 percent. A farmer needs to weigh



Prevalence of QPX (top graph) and nodule intensity (bottom graph) increased with increasing initial planting density of quahogs. Bars sharing a common letter were not significantly different. Standard error bars are shown.





the trade offs between higher survival and the most cost-effective use of the often-limited space on the farm. Selection of a planting density should be done thoughtfully.

Sell Early

In cases where QPX threatens a crop, a farmer may want to approach state authorities to explore the possibility of selling animals before they reach their normal minimum legal size. Permitting authorities (e.g., the Division of Marine Fisheries in Massachusetts) have allowed this for farmed product as the size limit is primarily a management tool for wild populations. Special permits can also be obtained by interstate wholesalers to sell product to states using the receiving state's minimum legal size.

Conclusion

Managing disease is tricky and often frustrating. The recommendations here hopefully provide some useful ideas, and perhaps prompt you to come up with your own solutions adapted to your farm. We encourage you to stay up to date on developments in the field and take advantage of your local resources.

This document, a collaboration of the Woods Hole Sea Grant Program and Barnstable County's Cape Cod Cooperative Extension, should be cited as follows: Managing Quahog Parasite Unknown (QPX) Disease by W. Walton and D. Murphy.



- Printed using soy based inks on FSC certified 30% post-consumer and 70% virgin fiber paper
- Paper manufactured using biogas energy
- Paper certified EcoLogo and FSC Mixed Sources

Additional Reading & References

Calvo, LMR, et al. 2007. Influence of host genetic origin and geographic location on QPX disease in northern quahogs (= hard clams), *Mercenaria mercenaria*. *Journal of Shellfish Research* 26(1): 109-119.

Dove, ADM, et al. 2004. Histological Analysis of an Outbreak of QPX Disease in Wild Hard Clams *Mercenaria mercenaria* in New York. *Journal of Aquatic Animal Health* 16(4): 246-250.

Ford, SE, et al. 1997. Evidence that QPX (quahog parasite unknown) is not present in hatchery-produced hard clam seed. *Journal of Shellfish Research* 16(2): 519-521.

Lyons, MM, et al. 2006. Development of a real time quantitative PCR assay for the hard clam pathogen Quahog Parasite Unknown (QPX). *Diseases of Aquatic Organisms* 72(1): 45-52.

Maas, PAY, et al. 1999. Molecular characterization of QPX (quahog parasite unknown), a pathogen of *Mercenaria mercenaria*. *Journal of Shellfish Research* 18(2): 561-567.

Smolowitz, R, et al. 1998. Observations of a Protistan disease similar to QPX in *Mercenaria mercenaria* (hard clams) from the coast of Massachusetts. *Journal of Invertebrate Pathology* 71(1): 9-25.



Woods Hole Sea Grant
Woods Hole Oceanographic Institution
193 Oyster Pond Road, MS #2
Woods Hole, MA 02543-1525
508.289.2398
Fax 508.457.2172
www.whoi.edu/seagrants



Cape Cod Cooperative Extension
P.O. Box 367, Barnstable, MA 02630-0367
508.375.6849
Fax 508.362.4923
www.capecodextension.org