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HARD CLAM CULTURE METHOD DEVELOPED AT VIMS

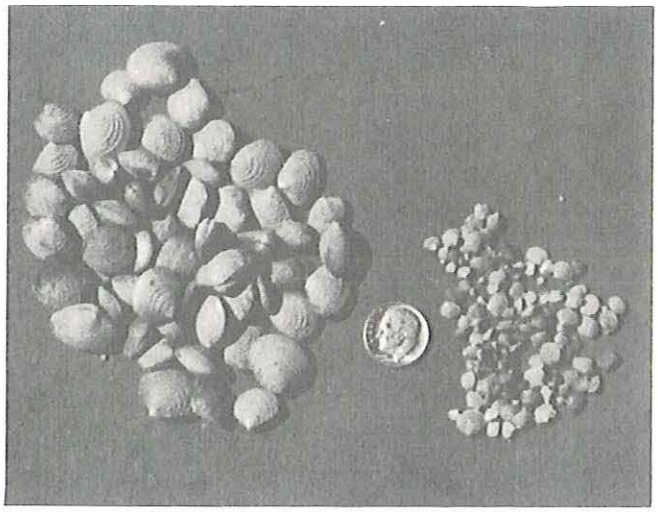
Aggregates on Bottom Protect Seed Clams From Predators

A way to protect hard clam seed from natural enemies has been devised by scientists at the Virginia Institute of Marine Science (VIMS). The new method involves spreading shell, gravel, or other materials, referred to as aggregates, over sand or mud bottoms before planting of seed.

Predators destroy nearly all unprotected clams smaller than one inch. The blue crab is the major predator in Virginia waters. Other crabs, boring snails, bottom-dwelling fish and waterfowl also take many clams. The hard clam (quahog) requires moderately high-salinity waters where these predators abound and often prevent natural reproduction from being successful.

Experimental methods of protection in the past have included planting clams: 1) in screened trays or boxes, 2) within fenced enclosures, 3) under sheets of netting or hardware cloth, 4) in saltwater ponds or tanks, and 5) intertidally. However, these techniques are unreliable, expensive and cause silting and slow growth, hence have not been suitable for commercial use.

Broadcasting aggregate over bottoms or clam beds is a simple procedure. It appears that increased yields will soon pay for initial cost of the aggregate and there is no maintenance. The Maryland hydraulic escalator clam harvester automatically deposits buried shell on the surface, hence if buried shell is available, harvesting of clams will prepare beds for planting.



On left is fingernail size seed now planted by industry. On right is match-head size seed reared by hatcheries which could be planted if protected with aggregate.

In addition to boosting production from commercial beds, the new technique promises to encourage the operations of clam hatcheries. Several are now operating experimentally on the Eastern Shore of Virginia and elsewhere. Hatcheries can offer an almost limitless supply of seed clams from selected, fast-growing parents. A major obstacle has been growing seed clams to usable size after they have been reared to setting. Holding millions of young clams in trays to avoid predators requires expensive handling, feeding, and cleaning operations. The use of aggregate makes it possible for these tiny clams to be grown on bottoms instead of in trays.

Tests With Hard Clams On Eastern Shore

Experiments with aggregates began in April 1967 on the seaside of Eastern Shore where most hard clams are harvested in Virginia. During preliminary tests scientists discovered that three aggregates successfully protected small hard clams (*Mercenaria mercenaria,* also referred to as *Venus mercenaria*). These three aggregate covers were: 1) crushed oyster shell, 2) crushed stone (as used in road building, and 3) stream bed gravel (sold as pea gravel).

An average of more than 80 percent of the seed clams planted on these covers survived through seasons when the blue crab and other predators were most active. In two tests more than 90 percent of the clams lived. In control plots where clams were planted without any aggregate protection, survival was about 16 percent but never more than 30 percent.

Young clams of various sizes were grown in the Wachapreague Laboratory to serve as test animals. These clams ranged from 1/25 to 1 inch, between the extremely small seed not used by industry to the fingernail size seed now planted.

Clams larger than match-head size survived best. Smaller clams were apparently too mobile and would leave the protection of the aggregate and thus become exposed to predators. (This moving is possible because the clam, unlike the oyster, retains its foot after setting). Further testing, however, showed that even clams as small as 1/25 to 1/5 inch survived in acceptable numbers in some plantings.

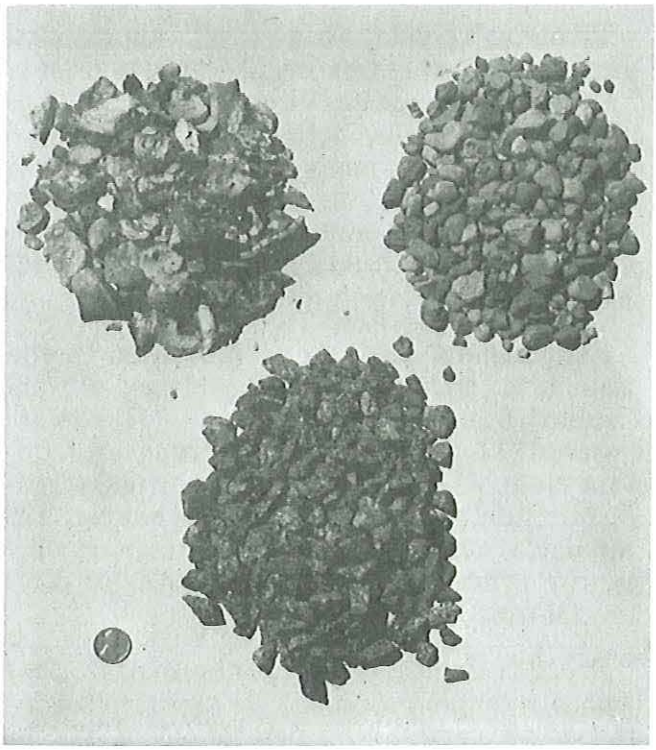
Future Tests

VIMS will continue experiments with aggregates on the seaside of Eastern Shore under the direction of Michael Castagna, Scientist-In-Charge, VIMS Wachapreague Laboratory. Plans also call for testing the new method in Lower Chesapeake Bay where environmental conditions may be somewhat different. Dexter Haven, Head, Department of Applied Biology at VIMS Gloucester Point station will direct these latter experiments.

VIMS Recommendations

For those clammers who may wish to initiate trial plantings with aggregates, VIMS offers the following suggestions:

1. Select aggregates that are cheap and plentiful in your area. Almost any aggregate can be used. Exactly which type offers best protection has not yet been determined, but even if it is, the planter will still have to weigh the amount of increased protection offered by one aggregate against the cost and availability of other aggregates. For example, if tests were to show that crushed shell gives ten percent more protection than crushed stone, but the shell in a particular area costs twice as much, the shell may not be worth the additional protection and cost.



Three aggregates which successfully protected small clams from predators. Top left, crushed oyster shell. Top right, pea gravel. Bottom, crushed stone.

2. Before buying an aggregate in bulk, test to see if particles are:

   a. heavy enough to sink and remain on bottom

   b. small enough to pack well

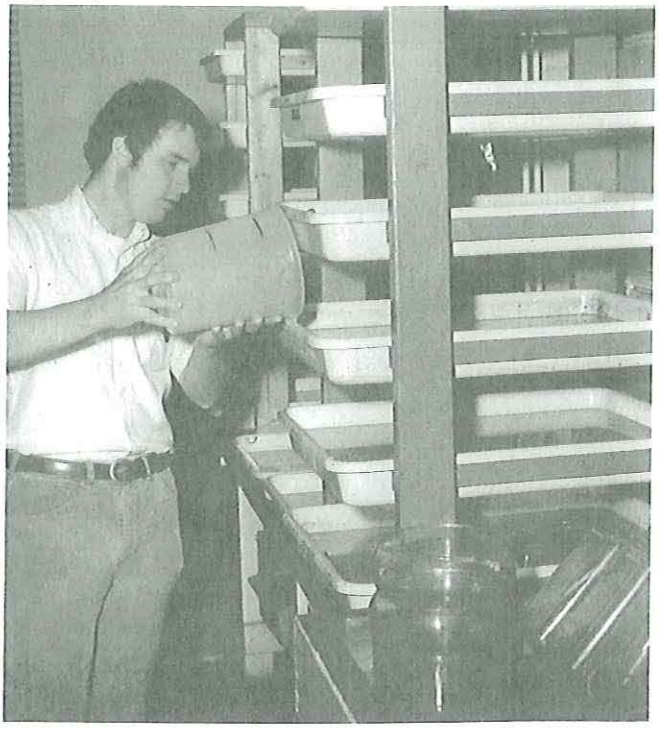
3. Spread aggregate over clam planting area to a thickness of at least one to three inches when using coarse materials (uncrushed shell) and one to two inches when using fine materials (pea gravel, crushed stone or crushed shell). Aggregate can be leveled by dragging a 4 ft. section of cyclone-type fencing over area.

4. Scatter seed clams evenly over the aggregate at a rate of about 25 to 50 per sq. ft. The clams will burrow through the aggregate and into the bottom. It is important that you do not overplant because crowded clams will move away from each other and could possibly move out of the protected area. Further, if too crowded, they will not grow as fast because of competition for food and space.

5. Aggregate can be put on bottoms any time of year. Clams should be planted when they are active, that is when water temperature is 48°F or higher. Clams will burrow under aggregate in a short time at higher temperatures. Plant at slack tide to avoid excessive clumping or scattering of clams.

To summarize:

1. Select inexpensive materials
2. Test aggregate



Young clams of various sizes were grown in the VIMS Wachapreague Laboratory to serve as test animals in experiments with aggregates. Many trays of clam larvae were spawned, cultured and maintained by VIMS scientists and technicians, as shown above.

3. Spread a thick aggregate cover on planting grounds
4. Plant clams at the proper number per square foot. (*Do not overplant*).
5. Plant clams when water temperatures are warm enough and tide is not running.

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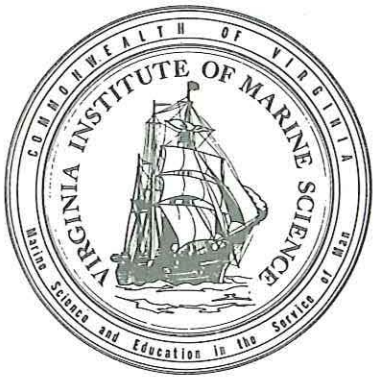

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