

Innovative Thai Bivalve Hatchery Makes Significant Progress

Bivalve Culture in Thailand

Shellfish are popular seafoods in Thailand and are marketed throughout the country. Mussels (especially the green mussel, *Perna viridis*), oysters (*Saccostrea commercialis* and *Crassostrea* spp.), cockles (mainly *Anadara granosa*) and short neck clams (*Paphia undulata*) are among the most popular. The first three products originate almost solely from aquaculture (see Newsletter, January 1981, p. 3).

Oyster farming is spreading rapidly. The small oyster (*Saccostrea commercialis*) is commonly cultured along the inner Gulf of Thailand. Natural seed is abundant throughout its range. The larger *Crassostrea* species, in particular *C. lugubris* and *C. belcheri*, are more highly prized and most of the harvest is sold to Bangkok restaurants. Interest is growing in the culture of these two species which are confined mostly to brackish inlets or rivers in the southern part of the country. However, many potential farming areas exist. Other bivalve species of considerable potential economic importance are underexploited. Some of these, such as the fan shells (Pinnidae) and giant clams (Tridacnidae), are highly valued in Asian markets and hatchery seed production may be profitable.

At the request of the Thai government, ICLARM has provided technical



All bivalve seed in Thailand is currently collected from wild stocks on collectors, such as these green mussels on a net collector, Satun.

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assistance in training and in the design of hatchery facilities. A pilot hatchery has been developed at the Prachuap Khirikhan Brackishwater Fisheries Station as part of the large cooperative project between ICLARM and the Thai Department of Fisheries, financed by the German Agency for Technical Cooperation (GTZ). This hatchery is the only one of its kind in Southeast Asia and is being used to develop rearing methods for all commercially important Thai bivalves (see Newsletter, July 1984, p. 24). The knowledge gained will be applied to the operation of a production hatchery,

presently under construction. The production hatchery will have an annual capacity of 100 million juveniles of mixed species.

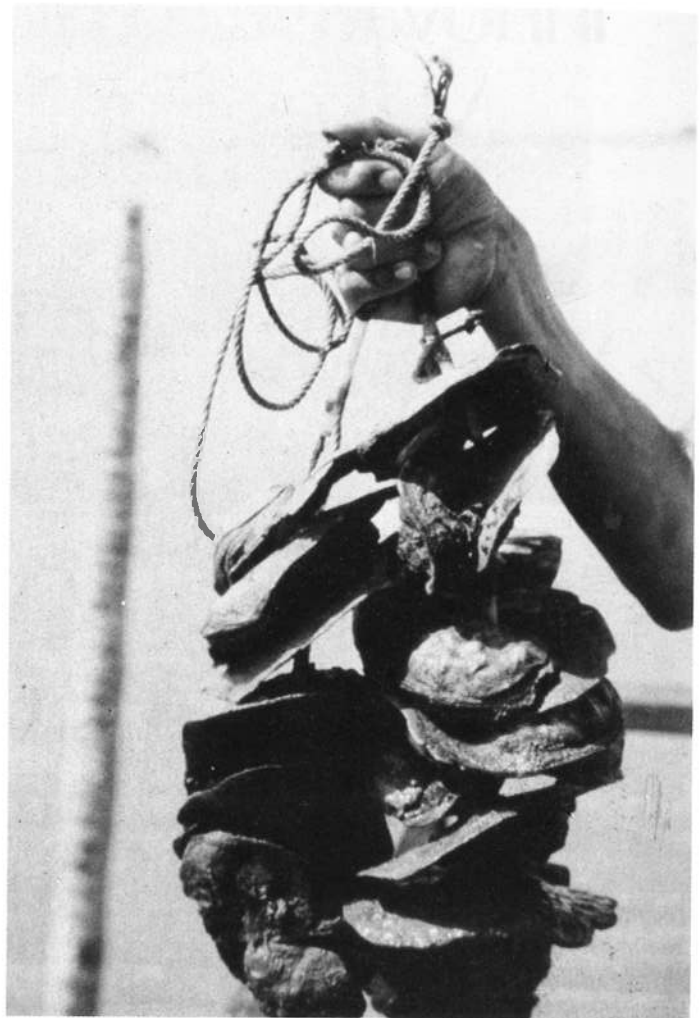
Pilot Hatchery Operations

Broodstock for the large oysters are maintained in a small seawater pond of which the water is changed regularly. Careful records are kept of individual spawners; mass spawnings have occurred and it is hoped that rematuration will occur. Spawners of other bivalve species are taken from wild stocks. Hatchery operations

are adjusted to the seasonality of maturation of species of interest.

The pilot hatchery has a culture media preparation room, algal culture laboratory and larval rearing room. Larvae are reared in 500- or 50-liter fiberglass tanks. Five micron-filtered seawater is sterilized in ultraviolet light before delivery to the rearing tanks. Carbon dioxide gas is fed in small amounts to the algal cultures to produce high quality algal cells. A Tahitian strain of the microalga *Isochrysis galbana* was recently introduced from Hawaii and has given excellent results in cell yields, larval growth and survival.

The larval rearing techniques are standard for all species and follow methods developed in American hatcheries. Different methods are used to induce spawning, depending on the species. Thermal shock, as described in the following article by Drs. Wong and Lim has proven effective



Top left: Oysters shaded by mats, Thailand.
Top right: Spat collector, Tha Thong, Thailand.

on cockles. The large oysters are spawned by alternate drying and immersion in flowing seawater at ambient temperature, although stubborn specimens may require heat shock in flowing seawater.

Fan shells (*Pinna bicolor*) have been successfully spawned using hydrogen peroxide at 100-200 ppm. Although larval rearing techniques remain to be fully worked out, the successful spawning of *P. bicolor* is significant in view of the excellent export potential for its large posterior adductor muscle. Wild stocks are likely to be rapidly overfished. In larval rearing, high mortalities of late veliger and early umbo stages are the most pressing problems. A number of solutions involving improvements in water quality, use of antibiotics, density control and changes in feeding methods are being tried.

At the Prachuap Khirikhan station hybrid oyster spat (*C. lugubris* x *C. belcheri*) have been produced. The

hybrids are more viable in the hatchery than the spat of either parent.

The Prachuap station has also scored a first with its production of single or "cultchless" tropical oyster spat. Larvae are set on small, size-graded ground shell, using methods developed in commercial hatcheries in the United States. Spat are transferred to lantern nets hung in the nearby seawater canal once they have reached 2.3 mm in length. Survival from this stage to three-month-old juvenile has averaged 75%. Hybrid and single species oyster spat have been set on shell and as singles, and both can be integrated into existing small-scale oyster culture

systems. Several potential test sites have been selected for future grow-out trials.

Several hundred thousand cockle larvae have also been reared to metamorphosis and staff biologists are developing setting and nursery techniques. One of the benefits of the hatchery work has been the observation of larval cockle shell characteristics which enables positive identification of planktonic cockle larvae. This information will greatly aid field studies of the dispersion of cockle larvae and the location of setting grounds.

Much work remains to be done, but the work at Prachuap Khirikhan has demonstrated the potential of a tropical bivalve hatchery. Indeed, private sector interest in the production of large oyster seed has already been manifested. Knowledge is being accumulated which will prove invaluable during the startup of the first tropical bivalve production hatchery, scheduled for operation sometime next year. ●