Trochus

Name of species/group

Trochus niloticus (Mollusca: Gastropoda).

Primary potential

Stock enhancement. Potential in aquaculture (selling small juveniles to the aquarium trade as 'cleaners').

Attributes for aquaculture/stock enhancement

- Hatchery technology for mass seed production is easy and standardised.
- Large-scale production of small juveniles (1–2 mm) is economical under Pacific conditions.
- Broodstock are readily available in certain localities in the Pacific and large adults are highly fecund (0.5–1 million eggs).
- Spawning is readily induced without the need for specialised equipment.
- The larval cycle is simple and larvae do not require feeding during the planktonic larval phase.
- Hatchery operations are relatively disease free.
- Juveniles and adults are easily transported for stocking.
- Trochus could be grown in polyculture with other molluscs, e.g. giant clam.

Culture methods

Juvenile production

- Juveniles for stock enhancement and culture are not available from the wild and need to be produced in the hatchery.
- Hatchery technology is simple and the techniques for mass production of small juveniles are standardised and cost-effective.
- Heat treatment (2–3°C increase in water temperature, and change of water) is used to bring about spawning.
- The planktonic larval phase is simple, short and non-feeding.
- Settlement plate/substrates are prepared with benthic diatoms such as *Navicula* and *Nitzschia* spp. for larval settlement about 5 days after fertilisation.
- Benthic diatoms for feeding are maintained with soluble commercial fertiliser such as Aquasol.
- Juveniles reach 1–2 mm diameter 4–8 weeks after settlement.

Seeding and stock enhancement

- Methods for transporting juveniles in 'moist' atmosphere have been developed.

- Methods for seeding juveniles on reefs have been established.
- Seeding for stock enhancement is a low cost and low technology operation that could be conducted on a small-scale or on a commercial basis.
- Seeding activities are suitable for women and artisanal fishers.
- Seeding for stock enhancement is environmental friendly and supports species diversity of the reefs. Where translocation to a new country is considered, potential environmental and species diversity issues need to be considered. However, more than 50 years of trochus translocation have produced few recorded instances of adverse impacts in the Pacific (there are reports of reductions in abundance of *Turbo setosus* at Aitutaki Atoll, Cook Islands, following introduction of trochus there in 1957, although *T. setosus* is known to be relatively common there at present).

Current production status

Juveniles

- Hatchery production is well established.
- Production of 1–2 mm size juveniles is economical but seeding with large juveniles (10–40 mm) may only be suitable and economic for establishing broodstock populations in new areas and not for general stock enhancement release.
- Large juveniles can be produced in sturdy cages fixed to reefs.

Marketable product

- Previous releases of adult broodstock have successfully produced viable trochus fisheries in the Pacific, but not all releases are successful. Recent ACIAR funded research has showed that broodstock can be used to enhance juvenile recruitment.
- Stock enhancement using hatchery-produced juveniles is still being refined. Recent research has shown that numbers could be enhanced but survival rates would have to increase to make it economic.
- 'Predator swamping' by releasing mass number of juveniles has been suggested as a method of enhancing juvenile survival in stock enhancement.

Marketing

Juveniles

- No known competitor in the aquarium trade.
- No marketing has been done for juvenile trochus for the marine aquarium trade.

Marketable product

- The market for trochus shell is well established.
- Shells are easily transported and non-perishable.
- Price of shells is subject to fluctuation. The high prices achieved in the early 1990s have come under severe pressure due to the downturn in price of mother-of-pearl shells (*Pinctada maxima*).
- Trochus meat has been reported to fetch a very high price in the Japanese market (especially in Okinawa); USD50–90/kg has been reported in the Okinawa fish markets. However, export of the meat is not economic due to the limited production of trochus meat for processing in the Pacific. Further, no marketing has been done on the acceptability and price of trochus meat from the Pacific to Okinawa.
- Processing of trochus meat for export has yet to be developed although it is believed that the methodology is relatively simple.
- Potential for selling the meat as a 'green and clean' product from the pristine environment of the Pacific region.

Comparative advantages/disadvantages (risks) of producing the species in the Pacific

Advantages

- The species is well established in the Indo-Pacific region. Where successful introductions with broodstock have taken place, the animal has proved to be benign and has been well received by the communities.
- It is a 'forgiving' and a good aquaculture 'training' species.
- Hatchery and seeding techniques are relatively easy and established.
- Recent ACIAR funded research has showed that broodstock can be used to enhance juvenile recruitment.
- Trochus hatchery and seeding work could involve the whole community and provide employment to women and youth.
- There is a well developed market for the shell product and the meat is readily acceptable and eaten by the people.
- Trochus can be value-added by making into button blanks and other shell jewellery.

Disadvantages

- Some Pacific nations need to translocate the broodstock from their neighbours.
- Methods of stock enhancement using hatchery-produced juveniles need to be refined. Recent research has showed that stock numbers could be enhanced but survival has to be increased to make it economic.
- Where enhancement is carried out, sustainable management practice needs to be put in place to ensure long-term viability.