

Turbo marmoratus Linnaeus, 1758

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IDENTIFICATION

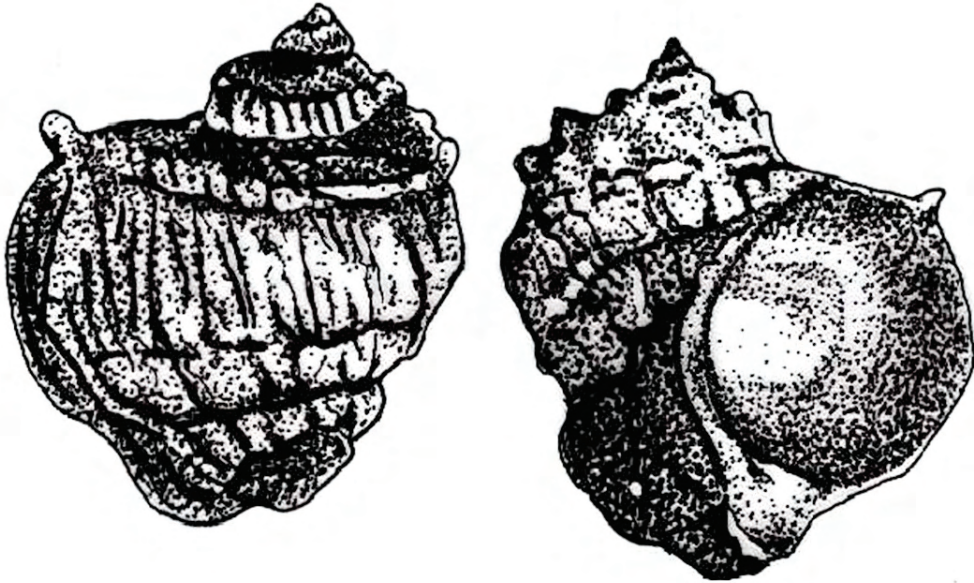
Order	: -
Family	: Turbinidae
Common/FAO Name (English)	: Great green turban shell



Local names: Not available

MORPHOLOGICAL DESCRIPTION

Turbo marmoratus is a large marine snail. It has a thick, heavy shell, dextrally coiled and roughly turban-shaped. The body whorl is large, with a small, pointed spire. The length of the shell is roughly equal to the width. The spire whorls are rounded, but the body whorl has an angular shoulder. The shell is marked with fine axial growth lines and three large spiral ribs, bearing blunt tubercles. The aperture is very large, forming two-third of the length of the shell, and is nearly circular, surrounded by a thick pearly lip. The operculum is calcareous, with a granular surface. Adults have a smooth white operculum whereas opercula of juveniles have granules. The colour is dull uniform green (greyish-green) with spiral bands of chestnut. Aperture is golden and operculum is white in colour.



PROFILE

GEOGRAPHICAL DISTRIBUTION

Turbo marmoratus is distributed in the Indo-Pacific and West Pacific region from south and east Africa to Fiji, covering the Andaman and Nicobar Islands of India, Malaysia, Indonesia, Thailand, Philippines, east of Japan, Australia, French Polynesia, Vanuatu and Ryuku Island.

HABITAT AND BIOLOGY

It inhabits the flats and slopes of coral reefs, but is also found in subtropical warm temperate regions where coral reefs are absent. It is found at depths of 10 to 30 m. Juveniles live on reef crests, while adults occur deeper on slopes to about 20 m or more. It is mostly gonochoric and is a broadcast spawner with external fertilization. The eggs are laid in gelatinous masses which hatch into planktotrophic larvae and later into juvenile veligers, before developing into fully grown adults. It is an herbivorous

marine gastropod. The shell reaches 18 to 22 cm in length. The size at first maturity reported is about 13 cm shell diameter. In tropical regions of their distribution, mature ones breed continuously throughout the year. A female green snail of wet weight 2.0 kg has up to 7 million eggs in a fully developed ovary.

PRODUCTION SYSTEMS

BREEDING IN CAPTIVE CONDITIONS

Turbo marmoratus has been successfully bred at Okinawa Sea-Farming Centre, Japan. Broodstock animals ranging from 12.6-20.8 cm shell diameter collected from the wild were kept in a 100 l polycarbonate tank at high density with good aeration for a day. The water which was fouled with the faecal matter and mucus from the animals was exchanged with fresh seawater the next day. This water exchange induced some snails to spawn. The males spawned first. The spawners were retained in a dark environment during induction of spawning. Spawning activity lasted up to half an hour. Since males were more responsive to induction, the sex ratio of snails was kept in favour of females. In another trial in Okinawa, the broodstock were collected and kept in outdoor concrete tanks without feeding for 1-7 days. These were then removed to smaller FRP tanks (1.6 x 1.0 x 0.65 m) for induction of spawning. In both the trials, seawater treated with UV-light was used for induction of spawning. Fertilized eggs hatched into trochophores in about 22 h at water temperatures between 21 °C and 23 °C and this can be reduced to 12 h at a temperature of 25 °C.

LARVAL REARING

On the first day after hatching, the trochophores and later, the veligers aggregated near the surface. The veligers were transferred to 4 l FRP tanks which had pre-culture of diatom. Culture seawater was not changed and only feeble aeration was given for the first 3-7 days. Pediveligers were formed on the third day and majority of the larvae settled during the fourth day. After this, settled juveniles were cultured in lentic seawater.

FOOD AND FEEDING

It feeds on attached algae and plant detritus. It feeds actively at night and forages among the rubbles for the algae. Adult green snail feed on epibenthic microalgae from limestone substrates. They also graze on macroalgae. In captive condition, green snail prefers green and red algae to brown algae even in dried conditions.

GROWTH RATE

In 3 months, the shell of early juveniles grew upto 3 mm diameter from less than 1 mm. The growth rate varied widely according to habitat and food availability; and shell width of 3 years old snails ranged from 1.5 to 6.5 cm.

DISEASES AND CONTROL MEASURES

Turbo marmoratus populations are susceptible to infestations of *Sabia* sp. causing juvenile mortality. Predation is a problem in outdoor culture systems where they are susceptible to predation by turbellarians.

PRODUCTION, MARKET AND TRADE

PRODUCTION

The Food and Agriculture Organisation of the United Nations (FAO) cites the total world production in 1985 at 500 t, based on the productions from only Australia and Malaysia. This had increased to 800 t in 1986 and to 1,000 t in 1987 and 1988.

MARKET AND TRADE

The flesh forms an important component of diet of fishermen and local communities throughout the Indo-West Pacific region. The nacreous shell is used in manufacture of buttons, and as inlay material for lacquerware, furniture and jewellery. It is also sold as decorative item, valued for its pearly shine. The large opercula are sold as paperweights or door stops. The green snail exports averaged 59.7 t/year in Papua New Guinea during 1950-1984. Annual exports from Solomon Islands averaged 7.1 t for the period 1981 to 1989. From Vanuatu Islands, exports averaged 21 t annually with a range of 7 to 65 t between 1966 and 1982. South Korea imported about 150 t of green snails in 1987. This species was used to be exported by Philippines, Malaysia, India and Indonesia to the USA, Japan and Korea in the 1970s. However, since then the quantities traded have decreased.

CHALLENGES TO MARICULTURE

The main challenges for green snail mariculture are the availability of broodstock and the high cost of hatchery practices and re-seeding failures due to high predation and survivability. Culture prospect of the species is yet to be explored in India.

FUTURE PROSPECTS

It is one of the most economically important gastropod species. It is used as an important traditional food item and a leading export item used as source for mother-of-pearl material for buttons and jewellery. In India the species is protected under Schedule IV of Wild Life Protection Act, 1972. However, with the development of successful captive breeding and hatchery seed production practices, the culture of *Turbo marmoratus* can be established in India, which will help in stock enhancement as well as provide resources for export.

SUGGESTED READING

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