Dascyllus trimaculatus (Rüppell, 1829)

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IDENTIFICATION

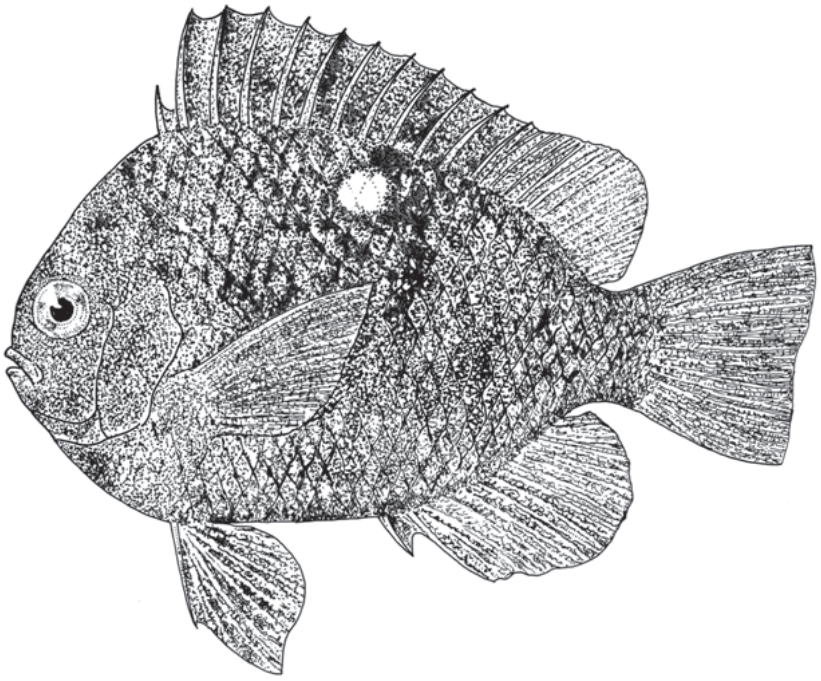
Order	:	**Perciformes**
Family	:	**Pomacentridae**
Common/FAO Name (English)	:	**Threespot dascyllus**

Local names: Paarakkotti, Barakkoti, Karipadatham (**Malayalam**)

MORPHOLOGICAL DESCRIPTION

Body is deep and mouth is oblique with maxillary almost reaching to below front border of the eye. Preorbital and suborbital with a row of elongate scales, the lower borders of which are finely denticulated. It has 4-5 irregular rows of scales on preopercle and one on inferior limb. A narrow posterior limb is naked. Hind border of preopercle is with minute denticulations. Scales on upper part of head reaching to end of snout, those before eyes are much smaller than the others. First

Source of image : RC of CMFRI, Mandapam Camp



dorsal spine is short. Second or third and fourth dorsal spines are slightly longer than the others, almost as long as head without snout. Soft dorsal bluntly pointed, the first ray as long as the last spine, the middle rays as long as the longest dorsal spines. First anal spine is short, the second is as long as the longest dorsal spines. Teeth are in several rows in jaws, with outer row slightly enlarged. Caudal fin is slightly emarginate, with the upper lobe longer than the lower lobe. Dorsal fin has 12 spines and 14-15 rays, anal fin has 2 spines and 14 rays, pectoral fin has 2 spines and 17-18 rays and the pelvic fin has 1 spine and 5 rays. Colour is dark reddish brown to brownish black in larger specimens. The scales are with dark hind border. Young ones with white blotch on nape and another in lateral line below 7th to 9th or 10th dorsal fin spines. These two blotches gradually disappear with growth. Dorsal and anal fins are dark brown distally, light brown basally. Caudal and ventral fins are dark. Pectoral fins are pale to dusky with dusky brown blotch at the upper edge of base.

PROFILE

GEOGRAPHICAL DISTRIBUTION

The species is distributed in the Indo-Pacific region from the Red Sea and east Africa to the Line and Pitcairn islands, north to southern Japan and south to Sydney in Australia. It has been reported from Indian waters also.

HABITAT AND BIOLOGY

Adults inhabit coral and rocky reefs whereas juveniles are often commensal with large sea anemones, sea urchins, or small coral heads. It is reef-associated and is moderately a common inhabitant of isolated coral heads and patches of rubble on sandy lagoons. It also inhabits passes and outer reef environments up to at least 55 m. It occurs in small to large aggregations.

The species is oviparous and exhibits distinct pairing during breeding. Eggs are demersal and adhere to the substrate. Males guard and aerate the eggs. While protogyny was originally proposed, recent studies confirm gonochorism in the form of non-functional hermaphroditism. In the wild its life span is 2 to 8 years, though it may live up to 20 years in captivity.

PRODUCTION SYSTEMS

BREEDING IN CAPTIVE CONDITIONS

The techniques for broodstock development, breeding and seed production of three spot damsel, *Dascyllus trimaculatus* have been developed and standardized by researchers of Mandapam Regional center of CMFRI. Broodstock development was done in 1 t FRP tanks with biological filter. Water in the broodstock tanks was exchanged @ 30 %, once in a week. Feeding of brooders was done once a day @ 5-10 % of its body weight with finely chopped fishes, shrimps and molluscan meat. The size range of brooders was 7-9 cm. The broodstock tanks were kept under translucent roofing to reduce the light intensity. Spawning in captivity was observed after 4-8 months of maintenance. Breeding was observed during early morning hours. Approximately 12,000 to 15,000 eggs were present in a single spawning. The eggs were attached either to the sides of the tanks or on the substrata provided inside the broodstock tanks. Average periodicity of spawning was 2 weeks. The development of egg took 3 days at 28 °C. Parental care by the male was noted. Hatching occurred on the evening of the fourth day of incubation. Studies on the effect of hormonal stimulation on the maturation and ovulation of oocytes were also conducted. Double injections of Surfagon (LHRHa) (5+15 µg/kg of fish body weight) with or without the addition of Eglonil (5+15 mg/kg) were used, and the interval between the injections ranged from 12 to 17 h. Ovulation was registered 33.5-42.0 h after the injection.

LARVAL REARING

Larvae were altricial type with no mouth opening at the time of hatching. The average length of newly hatched out larvae was 2.5 mm. The larvae were transferred to 5 t capacity circular FRP tanks in which harpacticoid copepod cultures were maintained in green water. Mouth opening appeared on the second day and the gape measured around 150 µm. The larvae started feeding on copepod nauplii from the third day of hatching. After two weeks, when the average size of the larvae reached 4 mm with an average mouth gape of 450 µm, freshly hatched *Artemia* nauplii were fed *ad libitum*. The larvae start metamorphosing from 35th day of hatching and all the larvae were metamorphosed by the 40th day. The just metamorphosed young ones measured 12-13 mm in length. The average survival rate ranged between 10-15 %.

NURSERY REARING

Information not available

GROW-OUT

Information not available

FOOD AND FEEDING

Three spot dascyllus are omnivores. In the wild, it is a planktivore feeding on copepods and other planktonic crustaceans, but also consumes benthic algae and weeds in the process of ingesting smaller crustaceans inhabiting these algae covered surfaces. In captivity, it feeds on a variety of diet that includes meaty foods such as mysis shrimp, enriched brine shrimp, krill, finely chopped shrimp and other crustacean flesh. Studies on food and feeding in Red Sea, off the coast of Jordan, indicated that it fed on invertebrates such as amphipods, isopods and other crustaceans. Crustaceans, molluscs and polychaetes were present in its gut throughout the year, with crustaceans dominating.

GROWTH RATE

It can reach up to 14 cm but typically grows to about 12.5-13 cm in captivity.

DISEASES AND CONTROL MEASURES

Dascyllus trimaculatus is prone to parasitic infestations, mainly *Brooklynella hostilis*, which leads to skin turbidity. This parasite can be treated with the combination of formaldehyde (1 drop/4-5 l or 1 ml/100 l) and malachite green (1 ml or 20-25 drops/100 l). Quinacrine (100-250 mg/100 l for 10 days) is

also effective, but can be toxic to weaker fish. The strongest fish is provided with freshwater baths to kill as many parasites as possible. Another disease reported in this species is bacterial infection either single or mixed strains. This can be treated with the help of any approved antibiotics, such as Penicillin (1.5-2 gm/100 l for 24 h); Tetracycline (3-4 gm/100 l for 2-3 days); short bath with Copper Sulphate or salt.

PRODUCTION, MARKET AND TRADE

PRODUCTION

Information not available

MARKET AND TRADE

Damselfishes make up almost half of the global marine ornamental finfish trade. During 1997 to 2002, globally 78,536 numbers were exported and 1,02,650 numbers were imported. In EU and US for the same period, 33,078 and 69,572 numbers were imported and in US, 30,267 numbers were exported.

CHALLENGES TO MARICULTURE

Although spawning and hatching have been achieved in captivity, the major obstacle to successful mariculture of the species is poor survival of the larval stages. The poor larval survival is due to small mouth gape at initial feeding so research has to be carried out to find an appropriate feed for initial larval rearing.

FUTURE PROSPECTS

The techniques for broodstock development, breeding and seed production is developed and standardized, which can be scaled up for commercial level production. Mass scale hatchery production can pave way for a sustainable marine ornamental fish trade in the near future, which will help in enhancing the economic status of the farmer as well as aquaculture production of the species.

SUGGESTED READING

Allen, G. R., 1991. Damselfishes of the world. Mergus Publishers, Melle, Germany, 271 pp.

Bassleer, G. 2000. Diseases in marine aquarium fish: causes, development, symptoms and treatment. Bassleer Biofish, Westmeerbeek, Belgium, 96 pp.

Emelyanova, N. G., Pavlov, D. A. and Thuan, L. T. B. 2009. Hormonal stimulation of maturation and ovulation, gamete morphology, and raising of larvae in *Dascyllus trimaculatus* (Pomacentridae). J. Ichthyol., 49(3): 249-263.

Froese, R. and Pauly, D. 2016. *Dascyllus trimaculatus* in FishBase. January 2016.

Gopakumar, G., Ignatius, B., Santhosi, I. and Ramamoorthy, N. 2009. Controlled breeding and larval rearing techniques of marine ornamental fishes. Asian Fish. Sci., 22: 797-804.

Gopakumar, G., Madhu, K., Madhu, R., Ignatius, B., Krishnan, L. and Mathew, G. 2009. Broodstock development, breeding and seed production of selected marine food fishes and ornamental fishes. Mar. Fish. Info. Serv. Tech. Ext. Ser. (201): 1-9.

Gopakumar, G. and Santhosi, I. 2009. Use of copepods as live feed for larviculture of Damselfishes. Asian Fish. Sci., 22: 1-6.

Gopakumar, G., Sreeraj, G., Ajithkumar, T. T., Sukumaran, T. N., Raju, B., Unnikrishnan, C., Hillary, P. and Benziger, V. P. 2002. Breeding and larval rearing of three species of damselfishes (Family: Pomacentridae). Mar. Fish. Info. Serv. Tech. Ext. Ser. (171): 3-5.

Wabnitz, C., Taylor, M., Green, E. and Razak, T. 2003. From Ocean to Aquarium. UNEP - WCMC, Cambridge, UK, 66 pp.

www.marinespecies.org. Accessed on 18.10.2017.

www.animalworld.com/encyclo/marine/damsels/domino.php

www.animal-world.com/encyclo/marine/damsels/domino.php