

Dascyllus aruanus (Linnaeus, 1758)

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IDENTIFICATION

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



Local names: Kallikkotti (Malayalam)

MORPHOLOGICAL DESCRIPTION

There are 12 dorsal spines and 11-13 dorsal soft rays. There are 2 anal spines and 11-13 anal soft rays. The margins of preorbital, suborbital, and preoperculum are finely serrated. The depth of the body is 1.5-1.7 in standard length. Conical teeth on jaws. Pre-opercle is denticulated. This fish has a pale whitish-brownish colour and is easily identified by three broad dark bands across the body. The first band extends from the chin to the first two dorsal spines, the second from the base of pectoral fin to the 5th or 6th to 9th dorsal spines and the third from the anal fin to the soft dorsal fin. Dorsal and anal fins are brown. Caudal fin is greyish.



PROFILE

GEOGRAPHICAL DISTRIBUTION

The species is distributed throughout most of the Indo-Pacific region from the Red Sea and east coast of Africa to French Polynesia and Ryuku Islands to New South Wales and Lord Howe Island. It is also reported along the coast of India, Lakshadweep and Andaman and Nicobar Islands.

HABITAT AND BIOLOGY

The species is marine, reef-associated and non-migratory and inhabits a depth range of 0-20 m. *D. aruanus* lives among the branches of ramose corals throughout the Indo-Pacific region. Though, it prefers to be associated with live corals, it can easily adapt to dead coral colonies when live corals become scarce in nature due to their large scale death. The reported maximum length is 10 cm, the common length being 6 cm and the maximum age is 6 years.

The species is dioecious and exhibits external fertilization. Female is oviparous and exhibits distinct pairing during breeding. The individual fish spawns more than once in a year. The breeding season

almost extends throughout the year, with an active period from April to January. The size at first maturity is 38 mm. Fecundity ranges from 2,125 to 7,157 eggs in an ovary at a time. Males are aggressive against other fishes while they tend eggs. Male selects and protects the nest and performs courtship dance 1 m above the nest and escorts the attracted females to the nest site where spawning happens. Eggs are demersal and adhere to the substrate. Harem-type social structure is observed with 1 male and several females following linear size dependent rank order; male spawns with the females in order of rank. Males invite females to spawn in their nests; protecting the eggs until they hatch. Male and the largest female protect the home territory. Eggs hatch out at 24-25 °C in 44-51 h, with hatched out larvae measuring approximately 2 mm and are pelagic; feeding on plankton. The pelagic phase of the larvae lasts about 2 weeks.

PRODUCTION SYSTEMS

BREEDING IN CAPTIVE CONDITIONS

The broodstock development, breeding and larviculture of *D. aruanus* was developed and standardized by CMFRI, Kochi, India in 2006. The technology of formulated feeds for their rearing and maintenance in hatchery was developed by researchers of CMFRI in 2008. The broodstock was developed in 1 t capacity tanks with biological filter. Feeding was done @ 5-10 % of body weight, once in a day with finely chopped fishes, shrimps and molluscan meat. The size range of brooder was 7 to 8 cm. It spawned in captivity after 4-8 months of maintenance in the broodstock tanks. Prior to spawning, the parent fishes actively cleaned the site for attaching the eggs by rubbing it with their pelvic fins and picking off any loose particles or algae with their mouths. During spawning, females attached their eggs on the cleaned site, which were immediately fertilized by the males. The number of eggs per spawning ranged from 12,000 to 15,000. The interval between two successive spawning ranged from 10 to 14 days. The eggs were attached either on the sides of the broodstock tank or on the substratum provided. Parental care by the male was noted. Spawning occurred during the morning hours. The eggs were oval in shape. The development of egg took place in 3 days at 28 °C.

LARVAL REARING

Larvae are altricial type with no mouth opening at the time of hatching. The average length of newly hatched larvae was 2.4 mm. The larvae were transferred to 5 t capacity round FRP tanks, in which mixed culture of two species of copepods viz., *Pseudodiaptomus serricaudatus* and *Euterpina acutifrons* were maintained in greenwater. Mouth opening formed on the second day, and the gape measured around 160 µm. The larvae started feeding from 3rd day of hatching. The highest number of egg bearing copepods and nauplii in the larviculture system and the maximum larval survival was noted when the cell count of the greenwater was maintained at a range of 1×10^5 cells to 6×10^5 cells/ml.

After 20 days, when the average size of the larvae was around 4 mm, with average mouth gape of around 450 µm, freshly hatched *Artemia* nauplii was fed *ad libitum*. No mortality was noted after 20 days. The larvae start metamorphosing from 25 dph and it was completed by 31 dph. Young ones measured 8.0-8.5 mm in length.

FOOD AND FEEDING

The species is diurnal, occurring in small groups, feeding on zooplankton, benthic invertebrates and filamentous algae. There is no selective feeding of plankton; however the dominant groups are copepods and amphipods. Filamentous algae and fragments of coralline material sometimes enter the stomach along with the plankton.

Formulated feeds containing protein levels ranging from 180 to 560 g/kg and an energy level of 19 MJ/kg are fed to individuals of < 200 mg and 200-300 mg sizes for periods of 35 and 63 days. Optimum protein range that elicited the best growth is between 360 and 470 g/kg. There are reports of growth rates in terms of SGR of 1.1 with formulated feed containing 520 g/kg protein and 150 g/kg lipid. Studies by CMFRI found higher growth, i.e., 1.93 with feed containing 360 g/kg protein and 55 g/kg lipid in fish weighing 200 mg for a period of 35 days.

GROWTH RATE

In wild, *Dascyllus aruanus* attains total length of 61 mm at the end of first year and 97 mm by the end of second year of its life.

DISEASES AND CONTROL MEASURES

Lymphocystis is an infectious viral disease reported for the first time from the white-tailed damselfish imported from the Philippines through California in 1976.

PRODUCTION, MARKET AND TRADE

PRODUCTION

Information not available

MARKET AND TRADE

It is a commercially important exotic aquarium fish from the Indo-Australian Pacific region. It is small, attractive and sells at US \$ 1 to 5/fish in the international trade. During 1997-2002, worldwide 1,03,948 numbers were exported and 1,64,094 numbers were imported. In USA for the same period, 72,435 numbers were exported and 1,47,525 numbers were imported.

CHALLENGES TO MARICULTURE

Broodstock development, breeding and larval rearing in captivity have been achieved. There is a need to develop technique for nursery rearing and grow out culture of the species.

FUTURE PROSPECTS

Dascyllus aruanus is one of the topmost species in the marine ornamental fish trade. Techniques for captive breeding and larval rearing are available and hence a hatchery produced trade for the species can be developed.

SUGGESTED READING

Adrian, R. L. and John, T. O. D. 1997. *Dascyllus* spp.: new hosts for lymphocystis, and a list of recent hosts. J. Wildl. Dis., 13(3): 307-312.

Danilowicz, B. S. and Brown, C. L. 1992. Rearing methods for two damselfish species: *Dascyllus albisella* (Gill) and *D. aruanus* (L.). Aquaculture, 106: 141-149.

Durville, P., Chabanet, P. and Quod, J. P. 2003. Visual census of the reef fishes in the natural reserve of the Glorieuses Islands (Western Indian Ocean). WIO J. Mar. Sci., 2: 95-104.

Froese, R. and Pauly, D. 2016. *Dascyllus aruanus* 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.

<http://www.animal-world.com>

<http://www.biosearch.in/publicOrganismPage.php?id=2910>

Pillai, C. S. G., Mohan, M. and Koya, K. K. K. 1985. Ecology and biology of the white-tailed humbug *Dascyllus aruanus* (Pomacentridae) from Minicoy atoll. J. Mar. Biol. Ass. India, 27(1 & 2): 113-123.

Randall, H. A. and Allen, G. R. 1977. A revision of the damselfish genus *Dascyllus* (Pomacentridae) with description of a new species. Rec. Aust. Mus., 31(9): 349-385.

Vijayagopal, P., Gopakumar, G. and Vijayan, K. K. 2008. Empirical feed formulations for the marine ornamental fish, striped damsel, *Dascyllus aruanus* (Linnaeus 1758) and their physical, chemical and nutritional evaluation. Aquacult. Res., 39: 1658-1665.

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

www.liveaquaria.com

www.marinespecies.org. Accessed on 18.10.2017.