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## Feeding and Breeding Biology of *Mystus vittatus*: A Review

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### Abstract

*Mystus vittatus* is an important catfish species having good market demand as food fish and recently it has also made its entry in ornamental fish markets. In spite of several studies having been conducted on the feeding and breeding biology of this fish species, consolidated information on these aspects is not available. The present review, therefore, is an attempt to gather all available information on feeding and breeding biology of this fish species. Lacunae of information has also been pointed out which will be beneficial for future culture and management of this fish species.

**Keywords:** Food habit, Reproduction, Review, *Mystus vittatus*

### 1. Introduction

*Mystus vittatus* (Bloch, 1794) commonly known as Asian striped dwarf catfish is a freshwater fish species, a member of the Bagridae family (order Siluriformes). This species commonly occurs in inland waterbodies of India, Pakistan, Sri Lanka, Thailand, Bangladesh, Nepal and Malaysia [1, 2, 3]. It is also found in canals and irrigation channels; usually inhabits marginal vegetation in lakes and swamps with muddy substrates [4]. *Mystus vittatus* is an important target fish for small-scale fisherman [5, 6, 7]. This small, indigenous fish species has a good demand as a food fish in fish markets as it has high nutritional value in terms of protein, micronutrients, vitamins and minerals [7, 8]. Recently it has also got its entry in ornamental fish markets of India [9, 10] and has been reported to have moderate export price too [11].

Earlier number of researchers has documented information on the feeding and breeding biology of *Mystus vittatus*, but till now no such consolidated review report is available on that. So with this view, an effort has been made to consolidate all this information along with documentation on the lacunae of information which will be beneficial for further study and to explore its fishery.

### 2. Food and feeding habit

*Mystus vittatus* has been reported as a plankton feeder with preference for zooplankton; diversified food items like copepods, cladocerans, rotifers, ostracods, insects, oligochaetes, chlorophyceae, bacillariophyceae and debris have been documented in its gut content [12]. Copepods, insect larvae, rotifer and daphnids have been reported as main food items for this species by Bhatt [13]. Welliang and Amarsinghe [14] have documented Zoobenthos to contribute 22% of its diet with insect larvae as major component. Bhuiyan [15] has reported its preference for crustacea, protozoa and insect. Presence of plants, shrimps, insects, molluscs and fishes in the gut content of *Mystus vittatus* has been reported by Pethiyagoda [16]; Tripathi [17] has also reported that it feeds on insects and fish fry. Shafi and Qudus [18] have reported algae along with zooplankton in its gut. Chattopadhyay *et al.* [3] have reported moderate carnivorous filter feeding nature of *Mystus vittatus* on zooplanktons and poor predation on hardy prey items. Agarwal and Sharma [19] have reported it as a carnivorous fish; later this view has been supported by Chakraborti and Sinha [20]. Victor *et al.* [21] have reported *Mystus vittatus* as an omnivorous fish with most preference for animal food; bottom feeding habit has also been documented. The omnivorous feeding habit of this fish species has also been supported by Reddy and Rao [22] and Ahmed *et al.* [23]; Ahmed *et al.* [23] also have reported that *Mystus vittatus* is neither a true surface feeder nor a true bottom feeder, rather its food substances are distributed throughout the different layers of the water bodies. Hafeez and Qasim [24] have documented crustacean and insect larvae as the chief food for this fish species and have reported that this fish species feeds at all depth.

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Reddy and Rao [22] have observed seasonal variation in the rate of feeding. In general, maximum rate of active feeding has been observed during July-October and December-February by Bhatt [13] in *Mystus vittatus* from Aligarh; lowest feeding activity has been observed during March-June, prior to spawning. Hafeez and Qasim [24] have reported lowest feeding intensity in winter and higher in monsoon; though they have not correlated it with breeding periodicities.

No workers except Victor *et al.* [21] have studied the age wise variation of food preference in *Mystus vittatus*; though no variation of food items between juvenile and adult specimens have been reported by them. Monthly variation in the abundance of different food groups in the gut contents of this fish species has also been reported by them. Chakraborti and Sinha [20] have reported gustatory feeding habit of this fish; Chattopadhyay *et al.* [3] have reported its continuous tactile feeding behaviour throughout its growth.

### 3. Sexual dimorphism

Bhatt [13] has documented that male and female of *Mystus vittatus* can be distinguished externally with the presence of genital papilla in males which is absent in female fishes. The papilla becomes very prominent during the breeding season. Females are comparatively larger in size than the males. Singh and Sathyanesan [25] have reported hermaphroditism in *Mystus vittatus*.

### 4. Sex-ratio

Bhatt [13] has reported female dominance over male in the population of *Mystus vittatus*; which later has been supported by Rao and Sharma [26].

### 5. Length at first maturity

Bhatt [13] has reported 8 cm and 8.5 cm as length at first maturity for male and female of *Mystus vittatus*. Rao and Sharma [26] have reported 8.5 cm and 9 cm as length at first maturity for male and female of this fish species. Siddique *et al.* [27] have reported 5.9 cm (in Standard Length) as the length at first sexual maturity for female of *Mystus vittatus* while Sudha and Shakuntala [28] have documented 8.5 cm for the same.

### 6. Fecundity

Azadi *et al.* [12] have reported fecundity of *Mystus vittatus* to be ranged from 2,515 to 9,789. Hoque and Hossain [29] have estimated the fecundity of *Mystus vittatus* to be varied from 2,534 to 60,746 with mean fecundity of  $8,635 \pm 3,790.17$ . Mean total fecundity of  $12,180 \pm 5,812$  with range of 5,200-23,900 has been documented by Siddique *et al.* [27]. Rao and Sharma [26] and Islam *et al.* [30] have reported the fecundity of *Mystus vittatus* to be ranged from 3,500-18,800 and 18,210-44,620 respectively.

Azadi *et al.* [12], Siddique *et al.* [27] and Islam *et al.* [30] have reported positive correlation of fecundity with body weight, total length and ovary weight in *Mystus vittatus*.

### 7. Breeding periodicity

Prabhu [31] has reported October and November as spawning months for *Mystus vittatus* in brackish water ponds near Madras (currently Chennai). Qasim and Qayyum [32] have reported June-September as the breeding season with July and August as spawning months for *Mystus vittatus* at Aligarh; while Bhatt [13] has reported late in August-October as breeding season with September as peak spawning month

in the same area. Rao and Sharma [26] have reported that *Mystus vittatus* spawns between September and October, with peak spawning in October in Guntur, Andhra Pradesh. They also have reported that variation in spawning seasons of *Mystus vittatus* in different parts of India is due to variation of climatic conditions, in particular the onset of monsoon. August and September have been documented as spawning months for this fish species in Bangalore by Sudha and Shakuntala [28]. Hossain *et al.* [7] have reported April-August as the breeding season for *Mystus vittatus* in Mathabhanga river of Bangladesh. Rajagopal and Davidar [33] have studied the breeding periodicity of *Mystus vittatus* in Tamilnadu; they have reported December-March as breeding season in Kanyakumari whereas August-December in Kancheepuram.

Prabhu [31] has reported *Mystus vittatus* as a single spawner, which later has been supported by Qasim and Qayyum [32], Bhatt [13] and Rao & Sharma [26].

### 8. Conclusion

Till date no such proper conclusion is there regarding the feeding habit of *Mystus vittatus*; few workers have reported it as omnivorous fish whereas some others have documented it as carnivorous species. Mouth morphology and architecture play significant role in searching, capturing and collecting food in the alimentary canal; so study of all these could be a conclusive one. Study of the mucosal surface of the alimentary canal is also very effective to ascertain feeding habit of a fish. Earlier Chakraborti and Sinha [20] have studied on mucosal surface of alimentary canal of *Mystus vittatus* and have reported it as carnivorous fish. But they have studied only on adult specimens which are keeping the information on the feeding habit of other age groups at bay; so overall if there exists any difference in age group wise variation of food habit it's not clear from their study. On the other hand, Chattopadhyay *et al.* [3] have studied mouth morphology and architecture of *Mystus vittatus* and have reported its moderate carnivorous filter feeding nature; but this work is also not fully conclusive as number of samples was low (35 in number) and they have studied only on adult fishes as represented by the information provided by them on average total length of the specimens (8.8 cm). This same study should be continued involving all the age classes so that age wise variation in food preference if any can be documented. Digestive enzyme assays in the gut is also very effective in this aspect and this also should be studied in different age classes of *Mystus vittatus* to get a clear cut picture on age wise variation in food preference if any.

High fecundity of *Mystus vittatus* female has been reported by all the workers and comparative early maturation of male with respect to female fish has also been documented. On the other hand, female dominance over male in this fish population has been reported by all the workers who studied on this aspect; but the reason behind this has not been discussed by any of them. Earlier works have revealed the variation of breeding periodicity in different parts of India and Bangladesh. Difference in time for onset of monsoon has been documented behind this variation; but more detail documentation is needed to ascertain the correlation of breeding periodicity with few other hydrological parameters like temperature, pH and salinity.

So, lacunae of information which has been highlighted in this review article should be gathered to explore the fishery of *Mystus vittatus*.

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