

Predatory behaviour of a perch, *Nandus nandus* (Ham.)

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Abstract

Predatory behaviour of *Nandus nandus* was studied by offering *Cyprinus carpio* as prey. The study was conducted with six *N. nandus* (8.2 ± 0.2 cm and 7.60 ± 0.3 g) represented as P₁, P₂, P₃, P₄, P₅ and P₆. Three size categories of prey (*C. carpio*) such as small (2.0 ± 0.1 cm and 0.23 ± 0.01 g), large (3.6 ± 0.1 cm and 0.57 ± 0.01 g) and mixed group consisting of both small and large prey were used for 14 days of trial. Predatory behavior was classified as targeting, driving, catching, handling, resting and next attempt of catching prey. After introduction of prey into the aquarium predators followed the movement of preys by eye movements and tried to target smaller one first. The predator grasped the head of the prey by its jaws by a drive and engulfed it wholly into the mouth. The average handling time (time taken to manipulate and swallow prey from capture to cessation of pharyngeal movement) was 42 ± 2 sec and 47 ± 2 sec for small and large prey respectively. *N. nandus* were ingested more small prey than large prey though the size classes were equally available in case of mixed prey used. Although the prey consumption was higher in number when small prey were ingested but in weight the consumption was higher when ingested large size of prey. The study indicated that *N. nandus*, ingested more small prey and grasped the headfirst.

Key words: Predatory behaviour, *Nandus nandus*

Despite their high market preference and wide acceptability as food fish, predatory fishes have been neglected and discouraged in the aquaculture system of Bangladesh due to their food habit. Fast growing population growth of an undesirable fish can be effectively controlled with the help of predatory fishes. Thus, the predatory fishes can play a vital role to bring back the water body in a balanced condition (Sih 1987). *Nandus nandus* is locally known as “meni” or “veda” is widely distributed throughout the Indian subcontinent and are often the most common small predator in freshwater bodies (Mustafa *et al.* 1980). Now it is rarely found in the market and unfortunately it is one of the fish going to be extinct and now a days is considered to be an endangered species. Successful breeding and rearing of “meni” in farm conditions would be tremendously

helpful in preventing the fish from being extinct and to culture this fish in rice field. For successful rearing the knowledge of food and feeding habit of the species are prerequisite. Predatory fish are less well studied experimentally (Paszkowski and Tonn 1994, Das *et al.* 1998a,b). The present work was designed to study the predatory behaviour of *N. nandus* with the following objectives: (i) to determine the size specificity of the prey (*C. carpio* fry) taken by the *N. nandus* (ii) to study the predatory behaviour (movements and activities) during feeding and just after feeding of *N. nandus*.

Investigation on predatory behaviour of *N. nandus* was carried out for a period of two weeks in July'99 where *Cyprinus carpio* fry were offered as prey in six glass aquaria (60x35x30 cm) marked as aquarium No.1, 2, 3, 4, 5 and 6. *N. nandus* having total length of 8.2 ± 0.2 cm and weighing of 7.60 ± 0.3 g were used as predator. Six predators were selected from the laboratory stock placed into six aquaria in the laboratory and water was aerated continuously to maintain dissolved oxygen level at high. Predators were treated with salt (1% dip for 1hr) as a prophylactic treatment. The Predators were recognized as P₁, P₂, P₃, P₄, P₅ and P₆ following the corresponding number of the aquarium for the convenience of the study. Immediately after collection, the prey species were transferred into the laboratory and placed into a large stocking-tank. Fishes were kept into the tank without supplying any food for first two days. After that supplementary feed at the rate of maintenance ration (1% body weight) was supplied to the fish fry. Fish fry were then classified into two main size categories where small fry (total length of 2.0 ± 0.01 cm and weight 0.23 ± 0.01 g) and large fry (total length 3.6 ± 0.1 cm and weight 0.57 ± 0.01 g). Another group consisting of both small and large fry (50%+50%) was referred to as mixed size group. All three-size categories were offered as prey to *N. nandus* for the experiment in duplicate aquaria.

Six preys were released into the aquarium containing a predator at 9 am everyday, after an hour the remaining prey(s) was removed by hand scoop net from each of the aquaria. Then fresh preys were offered to each predator as earlier at the same time of the following day. The number of prey eaten by each predator was recorded everyday This process was continued for 14 days to study the predatory behaviour of *N. nandus*.

Targeting and catching of prey

When the prey (fry of *C. carpio*) were supplied, the predator (*N. nandus*) became active. Then they followed the movement of preys by their eye movements. Within a few moments, the predator targeted/selected a prey to be attacked and immediately tried to catch it (the prey) by a drive.

Handling and resting period

Prey handling time was recorded as the time from initial capture to the time the prey was swallowed *i.e.* the cessation of gulping movements and pharyngeal constrictions were recorded. Resting period, the duration between the completion of one meal and the start of taking of the second meal by the predator was recorded. If the predator intended to catch their prey for the second time, they moved in that direction in respect of the

position of the prey as like as previous attempt starting from targeting prey to the completion of the handling and goes to resting again.

It was found that the prey species (*C. carpio*) after introduction in the aquarium took their place just opposite to the position of the predator. During the experimental period when prey were given into the aquarium the predator stopped their all activities and followed the movement of prey only by eye movements keeping itself in a resting position preferably at a corner of the aquarium. Among the prey, the predator tried to target a prey preferably the smaller one first. When the predator came forward to the prey, the prey tried to escape from the attack. Thus the prey came downwards and again started to move for upper region in the anti-clock wise direction and moved toward another corner of the aquarium.

Many predators catch their prey either head region or tail region first. Catching of prey also depends on the size and shape of the prey, nature of the prey, abundance of prey and predators also. In the present study, when *N. nandus* catch prey on the head first, the predator firstly grasped the head of the prey by its jaw and finally engulfed the prey by taking it wholly in to the mouth. Das *et al.* (1998a) stated that *C. striatus* grasped the prey by its jaw at the head region first.

Time taken to manipulate and swallow prey from capture to ceasation of pharyngeal movements was counted as handling time. In the experiment average handling time was 42 ± 2 seconds and 47 ± 2 seconds for small and large prey respectively. Hoyle and Keast (1987) stated the handling time of around 50 seconds for large mouthbass, *Micropterus salmonides*, Das *et al.* (1998b) also found the average handling time of *C. striatus* around 48 seconds for the prey of *Labeo rohita* fingerlings that closely resemble this study. Resting period in between prey capture were observed. During that time the predators keeps itself quiet at a corner of the bottom of the aquarium. Resting period of *N. nandus* was continued for about two minutes. In some cases, the predator failed to capture the prey in first attempt and then took second attempt to capture it after a short rest in between. If the first attempt was successful the resting period maintained was found to be a little more than the unsuccessful attempt.

Three sizes of categories of prey such as small, large and mixed were supplied to the predators in this experiment to observe the preference of prey size by the predator. It was observed that 24 and 23 large preys were captured and ingested by the predators P_1 and P_2 respectively, 46 and 40 small preys were captured and ingested by the predator, P_3 and P_4 respectively. On the other hand predators P_5 and P_6 captured and ingested 40 (28 small, 12 large) and 31 (31small) mixed preys. It was observed that predators preferred the smaller size category prey over the large preys. Predator (*N. nandus*) ingested significantly more small preys than large prey though the both size class were equally available for P_5 and P_6 . Although the upper limit in prey size is constrained by the relationship between piscivore mouth size and prey body depth, piscivore tend to consume prey sizes that are much smaller than the maximum possible (Hoyle and Keast, 1987). The choice of small prey by predator might also be related to the fact that the

predator preferred to spend minimum energy to capture, ingest and digest the prey. In this experiment, *N. nandus* also consumed more small *C. carpio*. as a preference. This result is in agreement with that of Paszkowski and Tonn (1994), Das *et al.* (1998b).

Total biomass of prey captured and consumed by predatory fishes differed with prey size. It was observed that the predators consumed 0.064 to 0.121 g of prey per gram of predator per day. It was found that when the prey size was small the number of prey engulfed by the predator was greater but the consumption of prey in total biomass was higher when they consumed large prey.

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