

Morphometrical Analysis of *Scatophagus argus* in Kali River

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ABSTRACT

A euryhaline teleost, the spotted scat (*Scatophagus argus*) inhabits freshwater, brackish water, and marine settings. The growth rate of body parts in relation to the standard length was examined using biometry. We looked at fourteen morphometric traits. According to the study, the body's depth grew at the highest rate, followed by the pre-dorsal and pre-anal lengths, and the eye diameter grew at the slowest rate. The length-weight association was also examined in 518 men with a TL between 50 and 117 mm and 1,141 females with a TL between 140 and 340 mm. Additionally, two best-fit linear regression equations for males and females, respectively, were developed. Understanding the differences between the sexes, the connections between morphometric features, and the selective breeding of *S. argus* will be made easier with the use of this knowledge. Theoretically, these approaches might also support the indirect selection of qualities that are challenging to choose directly.

Keyword : *Scatophagus argus*, morphometrical analysis, kali river, Path analysis.etc....

1. Introduction

Scatophagus argus, also known as spotted scat [11], butterfish, Argus fish, spade fish, and spotted spade fish [12], is widely distributed throughout the Indo-Pacific, the Malay Archipelago, the Philippines, Australia, South and South East Asia, particularly India. It is also found in mudflats, mangrove swamps, harbours, upstream swamps, and estuaries. Salinity, temperature, dissolved oxygen, tide movements, river runoff, turbidity, and turbulence variations are characteristics of scats' habits. They possess a variety of biological characteristics that are highly wanted in farmed finfish due to their adaptations to thrive in such constantly changing conditions [13]. The fish's quality and flavour place it in the category of edible fish, and its spotted rhombic body places it in the category of fascinating aquarium fish. Transport of large fish to inland markets where they are sold for the same price as other table fish [14]. There is a lot of interest in creating propagation and culture procedures for the spotted scat because to its advantageous biological traits and commercial significance. In this area, brackish water aquaculture for this species has great promise.

Despite the market appeal and palatability of spotted scat, nothing is known about its biology. Research on *Scatophagus argus* eating and feeding habits. The qualitative characteristics of argus have been researched in the mangrove areas of Thailand by [6], the brackish and fresh water by [7], the estuaries of Bengal by [8], and the marine environment in and around Mandapam by [14]. The purpose of this study is to give some fundamental biological information on the diet and eating habits as well as the feeding indices of *S.* in light of the dearth of knowledge on the biology of the spotted scat. *argus*. To assess its critical significance in relation to nutritional value and physiological condition, the variations in the spotted scat's muscle biochemical composition with respect to season are investigated. The body of *Scatophagus argus* is a deep, heavily compressed, orange-tinged, silvery to golden brown colour with black dots. The entire body is coated with ctenoid scales. Villiform teeth on the jaws are arranged in multiple rows, with a clear lateral line running parallel to the back profile. The dorsal fin comprises 16 to 18 soft rays and 11 or 12 spines. Four-spine anal fin with 13–16 soft rays. The pectoral fins are rounded and short. 1 spine and 16 or 17 rays on each of the pectoral fins. 5 soft rays and 1 spine make up the pelvic fins. The caudal fin has 14 branching rays and is spherical in juveniles and truncate to slightly doubly emarginated in adults [12]. From southern India and Sri Lanka to southern Japan and Tahiti, as well as the Philippines [9], the Southeast Asian coast, and northern to southern Australia, it is widely spread throughout the Indo-West Pacific Ocean's near shore waters [10].

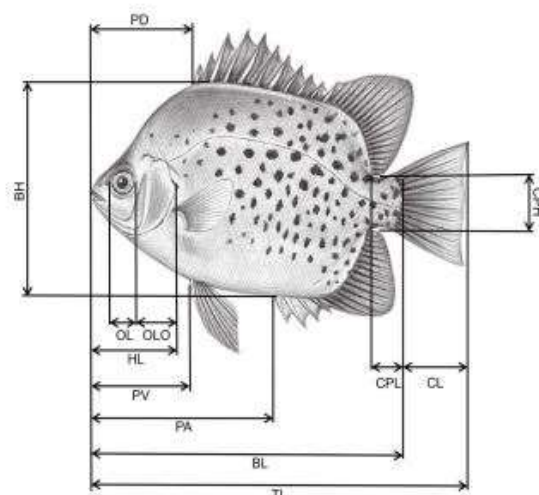


Fig. 1. Morphometric characteristics of the *Scatophagus argus*.

The spotted scat (*Scatophagus argus*) is widely dispersed throughout the Indo-Pacific area, including Southeast China, in mudflats, mangrove swamps, harbours, upstream swamps, estuaries, and maritime habitats. They have a variety of biological characteristics that are particularly desirable for finfish raised in aquariums as a result of their adaption to living in such a constantly changing environment[17][13]. The fish's quality and flavour place it in the category of edible fish, and its exquisitely speckled rhombic body places it in the category of fascinating aquarium fish [16]. Prior research centred on the control of this fish species' growth and reproduction [1],[2],[3],[4]. The properties of morphological traits in spotted scat are not well understood. Despite reports of *S. argus* artificial breeding, family breeding is behind as a result of the paucity of comprehensive selective breeding research. In *S. argus*, there are frequently notable disparities in both sexes' economically crucial growth features. Because females often grow more quickly and are larger than males, fisherman may command higher prices on the market[5],[6]. Consequently, the following goals guided this work: 1) using correlation analysis, determine the relationship between BW and the following biometric traits: body length (BL), body thickness (BT), head length (HL), depth of body (BH), eye diameter (OL), pre-anal length (PA), pre-ventral fin length (PV), post-orbital length (OLO), caudal peduncle length (CPL), pre-dorsal length (PD), depth at caudal peduncle (CPH), and caudal length (CL). Fishermen will benefit from the study's assistance in choosing practical biometric features to boost BW during reproduction.

2. MATERIALS AND METHODS

Morphometric traits measurement

Fish were stopped from being fed the day before the experiment and given 100 mg/L of MS-222 (Sigma, Saint Louis, MO) to put them to sleep. A total of 14 morphometric traits were measured, including BW, BH, PD, PV, PA, HL, OLO, OL, CPL, CPH, BT, BL, CL, and TL, in accordance with the measuring standard of morphological characteristics described in the previous work [15]. Individual BW measurements were taken using an electronic balance and were accurate to 0.01 g, whereas ImageJ (<https://imagej.nih.gov/ij/>; accessed February 2022) measurements of the other 13 morphological features were accurate to 0.01 cm (Fig. 1). Fish Database in Taiwan (<https://fishdb.sinica.edu.tw/>; accessed February 2022) provided the image of the fish.

2.1. Study Location and Duration

The study was carried out in Kali River, present in Uttara Karnataka.

2.2. Sampling and Specimen Collection

A total of 85 specimens of *S. argus* were gathered from fishermen trapped in cast nets, gill nets, coast seines, and seine nets every two weeks at two viable Kali River locations. By contrasting Talwar's and Kacker's

accounts of the same event, the fish was located. Immediately after being collected, the samples were taken to the Fish Biology Laboratory at the Brackish water Station of the Bangladesh Fisheries Research Institute (BFRI), Paikgacha, Khulna-9280, where they were submitted to additional research.

2.3. Measurement of Body and Data Analysis

The conventional approach recommended by 24 was used to analyse the morphometric and meristic properties. A magnifying lens was used to calculate the fin's ray count. The weight of each individual was determined using an electric balance with a 0.01 g accuracy. A measuring board was used to define several linear extents, including total length (TL), standard length (SL), head length (HL), predorsal length (PrDL), pectoral fin base length (PecFBL), etc. to an accuracy of 0.01 cm (Figure 2-a). This equation was used to list the relationships between length and weight:

$$W = a \times L^b$$

Where, *W* is constituting body weight (g) and *L* representing various lengths (e.g., TL, SL etc.) in cm. To estimate the regression parameters *a* and *b*, a linear regression analysis using the natural logarithmic formula ($W = \ln(a) + b \ln(L)$) was performed. *A*, *B*, and the coefficient of determination (r^2)'s confidence limits (CL) were also computed. A t-test was used to confirm the inconsistent *b* values discovered in the linear regressions 26, which was even more startling. The highest value of r^2 supported the best preferred fitted model for both LWRs and LLRs. Using Microsoft Excel 2016 and SPSS version 20.0, all statistical analyses were completed at a level of significance of 5%.

3. Discussions

Figure 2 displays the variations in morphometric characteristics between female and male *S. argus*. The measurement of 14 morphometric variables revealed highly significant variations in both sexes for these traits ($P < 0.01$). Females were generally much larger than men. BW and TL had the highest and lowest CV values among the 13 traits in both sexes, respectively. Males' CV values for each morphological characteristic varied from 4.792 to 15.472 percent, whereas female CV values ranged from 6.392 to 19.926 percent.

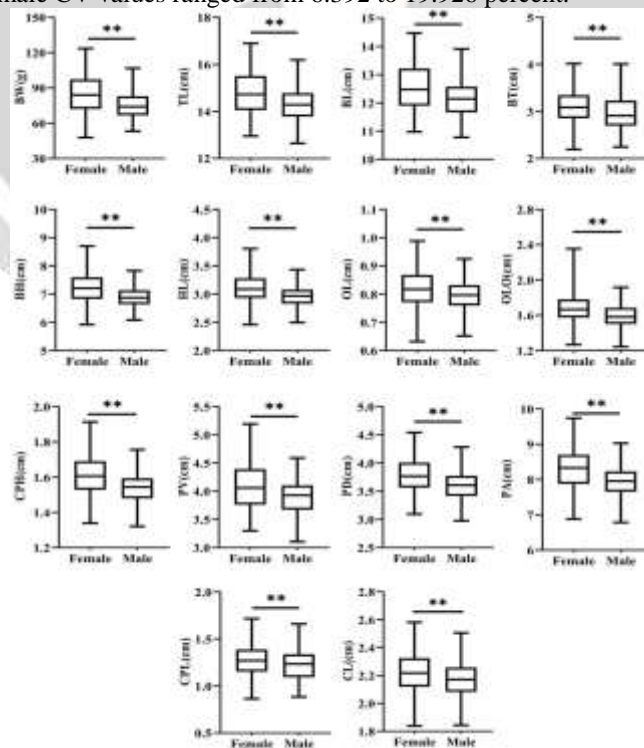


Fig. 2. Growth traits of female and male *Scatophagus argus*.

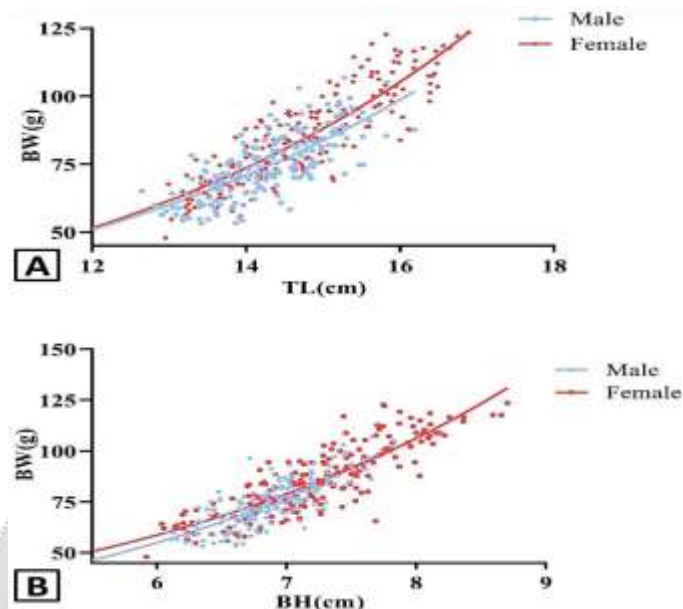


Fig 3 .Length-weight (A) and height-weight (B) relationship between female and male *Scatophagus argus*.

Strong associations between the TL and BW of *S. argus* in both sexes were determined through analysis (Fig. 3A). The power regression equations were $y=5.2410-2X^{2.74}$ for females and $y=12.1410-2X^{2.41}$ for males, respectively. In female and male *S. argus*, the power regression equations for BH and BW were $y=1.07X^{2.21}$ and $y=0.81X^{2.34}$, respectively (Fig. 3B).

4. CONCLUSION

This study examined the unique and intricate morphometric and meristic characteristics of *S. argus*, providing the required background knowledge for future research on systematic taxonomy, ontogeny, and comparison studies with other populations in the surrounding ecosystem. The information gathered in this study will undoubtedly make it easier to track the status of the species in Kali river regions and to design management and conservation strategies for the populations in the future.

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