

MERISTIC AND MORPHOMETRIC STUDIES OF RED SNAPPER *LUTJANUS ARGENTIMACULATUS* (Forsskål, 1775) FROM THE COASTAL AREAS OF KARACHI, PAKISTAN

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ABSTRACT

Present study aimed to study the morphometric characters and meristic counts of red snapper, *Lutjanus argentimaculatus* inhabiting the coastal areas of Karachi, Sindh. A total of 50 fish specimen (mean total length 14.5 ± 2.8 cm and 60.8 ± 3.6 g mean wet body weight) were collected from fish harbors of Karachi and their 22 morphometric characters, 16 meristic counts and 3 biometric characters were studied. The results showed that all morphometric data were not significantly different in all fishes. This study will help to recognizing the morphometric of different variants in relation to identification and also help the taxonomists and fisheries scientists to distinguish *L. argentimaculatus* from other species.

Keywords: Morphometric characters, meristic counts, *Lutjanus argentimaculatus*.

INTRODUCTION

Identification of a species is the most important aspect to be dealt with in any biological research work. Meristic counts and morphometric measurements are considered to be the as easiest and the authentic methods to differentiate among closely related species (Talwar and Jhingran, 1992). The red snapper, *Lutjanus argentimaculatus* is an important economic fish of coastal waters of Pakistan. It belongs to the family Lutjanidae of order Perciformes. Snappers have excellent quality of meat and their high demand make them most appreciated edible fishes in the market. There have been few studies on different aspects of the fishes of genus *Lutjanus* like life history of *L. campechanus* (Bradley and Bryan, 1995), Feeding behavior of *L. campechanus* (Szedlmayer and Shipp, 1994), morphometric and meristic character of *L. goreensis* and *L. agennes* (Fakunmoju *et al.*, 2014). However, there is paucity of data on the morphometric measurements and meristic counts of *L. argentimaculatus*. Therefore, present study was conducted to study these parameters of this important edible fish of Pakistan; this study will also help taxonomists to distinguish *L. argentimaculatus* from other species.

MATERIALS AND METHODS

A total of 50 specimens of *L. argentimaculatus* of variable size 12.4cm to 18.3cm (Standard length mean size 13.8 ± 0.6 and total length mean size 14.5 ± 2.8 cm) and weight (mean weight 60.8 ± 3.6 g) were collected from fish harbors of Karachi coast (West Wharf and Korangi Creek) during June 2014 to November 2014. The fish was identified by using the manual of Bianchi (1985). Fish were preserved in 10% formalin solution for further studies. The fish samples were transferred to the laboratory of Zoology Department, Federal Urdu University for Arts, Science & Technology, Karachi. The preserved specimens of different sizes were brought out of deep freezer and numbered, tagged in dorsal. All fishes of variable sizes were measured using (measuring board) centimeter scale. Morphometric characters were measured by the method of Hubbs and Lagler (1958) with slight modifications which are mentioned as: Weight of fish, total length i.e., from maxilla to the longest caudal fin ray, standard length i.e., from head to start of tail, head length i.e., from snout tip to most posterior edge of fleshy operculum, fork length, head breadth, interorbital width, pre orbital and post orbital length of head, diameter of eye; length of pectoral fin, measured from joint to tip of spinous portion, pectoral fin base, pelvic fin length i.e., from pelvic fin origin to tip of longest ray, pelvic fin base, anal fin length, anal fin base i.e., from anal fin origin to posterior base of last anal fin ray, caudal fin length, pre-dorsal distance i.e., from snout margin to base of first dorsal fin spine, pre-pectoral distance, pre-pelvic distance i.e., snout tip to base of first pelvic fin ray, pre-anal distance i.e., distance from snout tip to anal fin origin, Body depth at dorsal fin i.e., measured perpendicular to long axis of body at dorsal fin base, body depth at anal fin i.e., measured vertically at the end of anal fin base and length of caudal peduncle. In additional characters like occipital process length, occipital process width and Barbels were also studied.

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The methods of Jayaram (2002) were used to study meristic characters with slight modifications which are mentioned as: pelvic fin rays, pectoral fin rays, dorsal fin rays, anal fin rays and caudal fin rays, lateral lines, scales on lateral line, scale rows below lateral line, scale rows above lateral line, gill rakers on lower limb and on upper limb. Each fin ray number was derived from principal rays. A magnifying glass was used to count the ray numbers precisely.

Table 1. Biometric and Morphometric characters of *Lutjanus argentimaculatus*.

S.NO.	Body Parameters	Mean Length (cm)	% of the Standard length
1	Total length	14.5 \pm 2.8	-
2	Standard length	13.8 \pm 0.6	-
3	Fork length	11.8 \pm 0.7	85.50 \pm 4.12
4	Head length	3.9 \pm 0.2	28.26 \pm 8.14
5	Head breadth	1.3 \pm 0.2	9.42 \pm 1.03
6	Pre orbital length of head	1.2 \pm 0.1	8.69 \pm 1.02
7	Post orbital length of head	1.5 \pm 0.3	10.86 \pm 0.58
8	Eye diameter	1.5 \pm 0.2	10.86 \pm 1.23
9	Body depth at dorsal fin	4.1 \pm 0.5	29.71 \pm 3.64
10	Body depth at anus	3.7 \pm 0.4	26.81 \pm 2.18
11	Dorsal fin length	2.9 \pm 0.2	21.01 \pm 3.26
12	Pelvic fin length	2.6 \pm 0.3	18.84 \pm 2.71
13	Pectoral fin length	3.5 \pm 0.4	25.36 \pm 3.26
14	Anal fin length	1.6 \pm 0.3	11.59 \pm 1.38
15	Caudal fin length	2.9 \pm 0.4	21.01 \pm 1.46
16	Dorsal fin base	6.1 \pm 0.4	44.20 \pm 3.39
17	Anal fin base	1.9 \pm 0.2	13.76 \pm 1.65
18	Pectoral fin base	0.8 \pm 0.1	5.79 \pm 0.35
19	Pelvic fin base	0.5 \pm 0.1	3.62 \pm 0.85
20	Pre pectoral distance	4.5 \pm 0.7	32.60 \pm 2.35
21	Pre pelvic distance	4.3 \pm 0.6	31.15 \pm 4.15
22	Pre dorsal distance	4.6 \pm 0.5	33.33 \pm 3.68
23	Pre anal distance	7.8 \pm 0.8	56.52 \pm 5.65
24	Inter orbital width	0.5 \pm 0.1	3.62 \pm 0.81
25	Wet weight of preserved fish(g)	60.8 \pm 3.6	-

RESULTS

Biometric and Morphometric measurements of *L. argentimaculatus* are depicted in Table 1. The mean total length of sampled specimen of *L. argentimaculatus* was measured 14.5 \pm 2.8cm, mean standard length were ranged from 13.8 \pm 0.6cm and mean total wet body weight recorded 60.8 \pm 3.6g. The Head of fish was long, somewhat depressed, flat at ventral side, rising from the tip of the snout to its posterior margins. Anterior part of head (snout and pre orbital area) was without scales but some row of scales on cheek, pre operculum and on gill cover. A median groove on the head shallow, wide, starting in the line with the anterior margin of eye and reaching the base of occipital process. Its mean head breadth was 9.42 \pm 1.03% of standard length which was greater than its height. Head mean length 28.26 \pm 8.14% of standard length greater than its breadth. Mouth was terminal, transverse and moderately wide. Maxillae broadest posteriorly, teeth usually in few rows, conical and sharp on jaws. Barbels were absent. Upper jaw was slightly longer than the lower jaw. Eyes rounded, not mid-level of head behind tip to snout. The mean eye diameter was 10.86 \pm 0.58%. Mean pre orbital length of head (8.69 \pm 1.02%) was smaller than postorbital length of head (10.86 \pm 0.58%). Inter-orbital width is smaller than the head length with mean value 3.62 \pm 0.81% of standard length. Body depth maximum at the origin of dorsal fin was 29.71 \pm 3.64%. Mean body depth at anus was 26.81 \pm 2.18% of standard length. Pectoral fin length was 25.36 \pm 3.36% and longer than pelvic fin

length $18.8 \pm 2.71\%$. Pre pectoral distance was $32.60 \pm 2.35\%$ and longer than pre pelvic distance $31.15 \pm 4.15\%$. Pectoral fin base was $5.79 \pm 0.35\%$ and longer than pelvic fin base $3.62 \pm 0.85\%$. Dorsal fin centered above middle of standard length. Dorsal fin base was $44.20 \pm 3.39\%$ and longer than dorsal fin length $21.01 \pm 3.26\%$. Pre dorsal distance was $33.33 \pm 3.63\%$ and shorter than pre anal distance $56.52 \pm 5.65\%$ (Table 1).

Table 2. Meristic counts of *Lutjanus argentimaculatus*.

S.NO	Body Parameters	Numbers
1	Dorsal fin rays	10 spines
2	Dorsal fin rays	8 soft rays
3	Pelvic fin rays	1 spine
4	Pelvic fin rays	5 soft rays
5	Pectoral fin rays	0 spine
6	Pectoral fin rays	16 soft
7	Anal fin rays	3 spines
8	Anal fin rays	7 soft rays
9	Caudal fin rays	16 soft
10	Lateral line scales	40- 47
11	Scale rows above lateral line	4
12	Scale rows below lateral line	6
13	Gill rakers on lower limb	9
14	Gill rakers on upper limb	7
15	Adipose fin	absent
16	Barbels	absent

Meristic counts of *L. argentimaculatus* are depicted in Table 2. Dorsal fin was with 10 spine and 8 soft rays. Anterior dorsal fin spine long, straight and posterior spines were small. Spine margin was smooth anteriorly and laterally. Adipose fins were absent. Pectoral fin was originating just in front of the angle of operculum at the ventro-lateral side, without spine and 16 soft rays. Gill rakers on lower limb were 9 and 7 on upper limb were observed in most fishes (Total gill rakers 16). Pelvic fins with 5 soft rays and 1 spine. Anal fin base was $13.76 \pm 1.65\%$ and anal fin length was $11.59 \pm 1.38\%$. It's shorter than caudal fin length $21.01 \pm 1.46\%$. Anal fin not forming long pointed lobe. Anal fin was with 7 soft rays and 3 spines. Caudal fin was 16 soft rays, truncate and symmetrical. Longitudinal scales row above the lateral line horizontal and rising only below posterior portion of spiny dorsal fin and below soft dorsal fin rays. Lateral line was single with 40-47 scales, 6 scales rows below and 4 scale rows above the lateral line.

DISCUSSION

In the present study the morphometric measurements and meristic counts of *L. argentimaculatus* include standard length (13.8 ± 0.6 cm), pectoral fin length (3.5 ± 0.4 cm), pelvic fin length (2.6 ± 0.3 cm), anal fin length (1.6 ± 0.3 cm), dorsal fin length (2.9 ± 0.2 cm), pelvic fin base (0.5 ± 0.1 cm), pectoral fin base (0.8 ± 0.1 cm), dorsal fin base (6.1 ± 0.4 cm), anal fin base (1.9 ± 0.2 cm), highly increase with the total length (14.5 ± 2.8 cm), while eye diameter (1.5 ± 0.2 cm), inter-orbital width (0.5 ± 0.1 cm), pre and post orbital head length (1.2 ± 0.1 cm and 1.5 ± 0.3 cm respectively), highly increase with the head length (3.9 ± 0.2 cm). Data from these parameters suggest that the fish species from the different sampling stations were not separable taxonomically. These body parameters showed little variations among the specimens from the different stations that were also not significantly different. During present study, it was observed that barbell completely absent and it supports that the population of *L. argentimaculatus* present in Pakistan resembles to other Lutjanid species in its structure of many body parameters (Mirza, 2004; Ferraris and Runge, 1999; Fakunmoju *et al.*, 2014).

In the present study the meristic characters i.e., dorsal soft rays (8), number of dorsal fin spines (10), pectoral fin rays (16), pectoral fin spine (0), pelvic fin soft rays (5), pelvic fin spine (1), anal fin soft rays (7), anal fin spines (3), caudal fin soft rays (16), Lateral line scales (40-47), Scale rows above lateral line (4), Scale rows below lateral line (6), Gill rakers on lower limb (9) and Gill rakers on upper limb (7). These parameters remained constant in all specimens having different length and weight indicating no relation of body length and size on the meristic counts of fish as it has been described in previous reports (Talwar and Jhingran, 1992). There have been many studies who have reported the same results of meristic counts in diverse fish species (Richardson, 2010; Fakunmoju *et al.*, 2014). Meristic counts are based on more primitive characters than morphometric measurements and would therefore provide stronger evidence for speciation. The morphometric measurement and meristic counts of species did not show that the fish was taxonomically separable based on our methods. In conclusion, the knowledge of meristic and morphometric characteristics of *L. argentimaculatus* will contribute greatly to the understanding of the population structure of this.

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(Accepted for publication June 2015)