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Some aspects of mackerel diversity and morphometric studies of *Rastrelliger* genera from Port Blair Andaman waters

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Abstract

Mackerels are widely distributed in Indo-Pacific region and form an important commercial fishery resource of India contributing about 90% of the world mackerel production. The annual marine fish landings for India were found to be 3.78 million tonnes in 2013. In the present study fifteen morphometric characters were compared between the two mackerels, *Rastrelliger kanagurta* and *Rastrelliger brachysoma*. Mackerels of Andaman & Nicobar Islands mostly consist of two major species belonging to *Rastrelliger* genera. The major contribution is by the Indian mackerel *Rastrelliger kanagurta* Cuvier, 1831 and sporadic occurrence of *Rastrelliger brachysoma*, Bleeker, (1851), which is referred to as short bodied mackerel. Morphometric methods are very useful to understand the difference among these two species, which are very unique for mackerel diversity of Andaman Sea when compared to Arabian Sea and Bay of Bengal.

Keywords: Mackerels diversity, *Rastrelliger kanagurta*, *Rastrelliger brachysoma*, Morphometric methods.

1. Introduction

Mackerels are pelagic, shoaling fish widely distributed in the Indo-West pacific region ^[1]. Ninety percentage of the world mackerel production is contributed by India and fishes are of great domestic demand consumed both in fresh and cured conditions ^[2]. The mackerel fishery are mainly composed of 3 species, *Rastrelliger kanagurta*, (Indian mackerel), *Rastrelliger brachysoma*, (short bodied mackerel) and *Rastrelliger faughni* (Island mackerel). The annual landings of Indian mackerel along the Indian coast are about 2, 78, 495 tonnes, 1, 70, 297 tonnes and 1, 99, 880 tonnes during the years 2011, 2012 and 2013 respectively ^[3, 4]. The annual landings of other mackerels accounts for 8, 113 and 338 tonnes respectively in 2011, 2012 and 2013 respectively ^[3, 4].

The Indian mackerel are found to inhabit shallow waters where the surface water temperature is around 17 °C ^[5] and one of the important marine, pelagic neretic fisheries of our country. South West coast of mainland India is the most productive zone accounting for major landing and are also observed in the East coast ^[6] and in Andaman & Nicobar Islands ^[7]. The Andaman & Nicobar Islands have a coast line of approximately 1, 912 km, with sixteen fish landing centres located in different parts of these islands. Mackerels are found to be available throughout the year in these waters and landings of mackerel are 2535 and 2870 tonnes in 2012-11 and 2011-12 respectively ^[8].

Most of the studies pertaining to mackerels have been reported from the West coast of Indian mainland ^[9-17]. Occurrence of mackerels in Andaman and the systematic studies on *Rastrelliger kanagurta* and *Rastrelliger brachysoma* has been reported earlier ^[18] and some studies on the juveniles of *Rastrelliger kanagurtra* have been reported ^[19]. Taxonomic position of the genera *Rastrelliger* show that the mackerel have long gill rakers ^[20]. Three species namely, *Rastrelliger brachysoma*, *Rastrelliger neglectus* and *Rastrelliger kanagurta* have been reported from Indonesian waters ^[21]. They proposed that *Rastrelliger brachysoma* may be variant of *Rastrelliger neglectus*. Detailed morphometric and meristic characters of mackerels from Philippines ^[22] and the description of two species *Rastrelliger brachysoma* and *Rastrelliger chryzonus* confirm that *Rastrelliger neglectus* was a synonym of *Rastrelliger brachysoma* and *Rastrelliger kanagurta* was synonym of *Rastrelliger*

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chrysonus. Detail description of *Rastrelliger kanagurta* and *Rastrelliger brachysoma* from the Andaman waters has been reported [18] and recognized two species and considered *Rastrelliger neglectus* as a synonym of *Rastrelliger brachysoma*. A new species, *Rastrelliger faughni* which was earlier termed as *Scomber australasicus* apart from the other two species, has also been described [23]. Observations of both species *Rastrelliger kanagurta* and *Rastrelliger brachysoma* were observed from Java Sea [24]. A study is undertaken to differentiate both species of mackerels based on the morphology and morphometric characters.

2. Material and methods

Fish samples were collected from the fish landing centre at Junglightat, (11 °37'24.63"N & 92 ° 43'37.78" E) Port Blair during November 2012 to January 2013. It was observed that Purse seine is the gear most common used for catch of mackerels. Samples were transported to the laboratory in ice boxes for further identification. The morphometric measurements were carried out following the method as described by [25, 26] and the fish samples were preserved in 10 % formalin. Thirty fishes in each group with varying length from 18-22 were measured as described in Fig 1 from both the groups and the results are tabulated in Table 1.

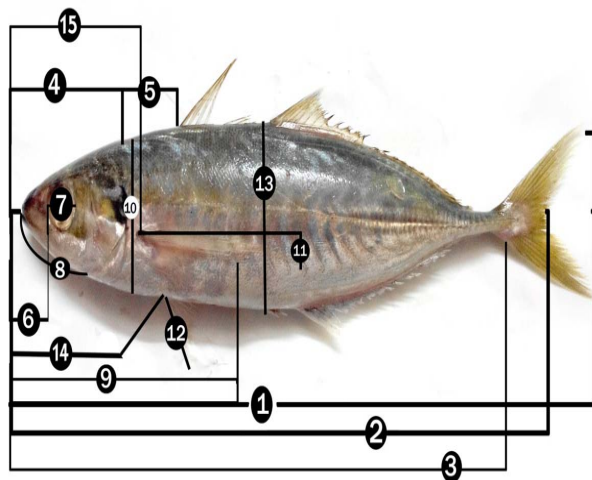


Fig 1: Morphometric measurements of the Mackerel.

1. Total length, 2. Fork length, 3. Standard length, 4. Head length, 5. Pre-dorsal length 6. Pre-orbital length, 7. Eye diameter, 8. Lower jaw length, 9. Pre-anal length, 10. Head depth, 11. Pectoral fin length, 12. Pelvic fin length, 13. Greatest depth, 14. Pre-pelvic length, 15. Pre-pectoral length.

3. Results

From the morphological observations (Fig 2, 3) it is observed that the body of mackerel are fusiform and compressed. Body is covered by small ctenoid scales, eyes with adipose eyelid. From the morphometric measurements as shown in Table 1 in both the groups of mackerels the ratio of fork length to greatest body depth is 1:1. Another prominent feature of the *Rastrelliger* genera is the gill rakers are very long, numerous and are clearly visible when the mouth is opened. Not much difference is observed among both the groups based on meristic characters. 8-10 dorsal spines, dorsal soft-rays 12, anal soft rays 11-12 and absence of anal spines.

Table 1: Comparison of morphometric characters of *Rastrelliger kanagurta* and *Rastrelliger brachysoma*.

Sl. No	Morphometric characters	<i>Rastrelliger kanagurta</i>	<i>Rastrelliger brachysoma</i>
1	Total length	19.8 ± 12.57	19.7 ± 11.28
2	Fork length	17.7 ± 11.05	17.5 ± 10.06
3	Standard length	17.3 ± 10.80	17.1 ± 9.87
4	Head length	4.8 ± 3.43	5.0 ± 3.02
5	Pre-dorsal length	5.8 ± 3.6	6.1 ± 4.23
6	Pre-orbital length	1.1 ± 0.84	1.1 ± 0.65
7	Eye-diameter	1.1 ± 0.84	1.1 ± 0.71
8	Lower-jaw length	2.4 ± 1.65	2.7 ± 1.7
9	Pre-anal length	10.6 ± 6.13	10.9 ± 6.34
10	Head depth	4.4 ± 2.83	5.3 ± 3.08
11	Pectoral fin length	2.2 ± 1.47	2.4 ± 1.42
12	Pelvic fin length	1.9 ± 1.29	2.1 ± 1.25
13	Greatest depth	4.4 ± 2.75	5.0 ± 3.02
14	Pre-pelvic length	5.1 ± 3.31	6.1 ± 3.56
15	Pre-Pectoral length	4.4 ± 2.74	4.9 ± 8.62



Fig 2: *Rastrelliger kanagurta*

The morphometric measurements of *Rastrelliger kanagurta* as shown in Table 1, shows that head constitutes 24.6 % and body depth constitutes 22.2 % of total length. Another characteristic feature of *Rastrelliger kanagurta* is that the length of the head is greater than body depth and eye diameter is 24.3 % of the head length.

Three longitudinal stripes present are above the lateral line and three rows of dark band horizontally present with each row varying from 14-16 and present at the centre of the body below 1st and 2nd dorsal fin. A prominent dark circular or irregular spot is observed near the pectoral fin. Tip of the 1st dorsal fin is spinous and slightly greyish in colour. (Fig 2).



Fig 3: *Rastrelliger brachysoma*

The morphometric measurements of *Rastrelliger brachysoma* showed that head is 25.3% and body depth is 27.03 % of total

length. The length of the head is almost equal to body depth in most of the samples which is depicted in Table 1. *Rastrelliger brachysoma* is bluish green in the top part of the body and slightly silvery below. The characteristic dark bands seen in *Rastrelliger kanagurta* are completely absent in *Rastrelliger brachysoma* (Fig 3).

4. Discussion

The ratio of fork length to greatest body depth is always 4:1 and head length to greatest depth is 1:1. These measurements are characteristic features of mackerels belonging to *Rastrelliger* genera [7]. The meristic characters of both did not show any significant differences. Both the species were found to have similar dorsal spines, dorsal soft rays and anal soft rays. *Rastrelliger kanagurta* head is greater than the greatest body depth [23]. Greatest height of the body is 23 % to 27 % of the fork length, similar results were observed in the present study. Similar observation for *Rastrelliger brachysoma* with greatest height of the body 28.6 % to 34 % of fork length [18]. Length of the head is shorter than the greatest depth of the body. It is 25.6 % to 28.7 % in fork length. Similar results for *Rastrelliger brachysoma* have been obtained in the present study.

5. Conclusion

The Indian mackerel *Rastrelliger kanagurta* constitutes a prominent group in both the Arabian Sea as well as in Bay of Bengal. Andaman waters have two kinds of mackerel, showing similarity to Indonesia, Malaysia and Thailand where mackerel population consists of both *Rastrelliger kanagurta* and *Rastrelliger brachysoma*. In Andamans vernacular language *Rastrelliger kanagurta* is referred to as “*khatta bangdi*” and *Rastrelliger brachysoma* as “*chapta bangdi*”. The main difference between the two mackerels is the morphology where *Rastrelliger kanagurta* is comparatively narrow bodied and *Rastrelliger brachysoma* is short-bodied. The morphometric measurements of these two species differ in 4 morphometric characters such as body depth, greatest depth, pre-pelvic and pre-pectoral length. *R.brachysoma* has more body depth and pre-pelvic length compared to *R.kanagurta*. Body colouration and occurrence of blotches is continuously differing in both the mackerels a character that can be used for identification and differentiation among the mackerels.

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