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Size Frequency and Length-Weight Relationships of Spined Anchovy, *Stolephorus tri* From the Coastal Waters of Besut, Terengganu, Malaysia

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ABSTRACT

Study on length-weight relationships of anchovy, *Stolephorus tri* collected from Benting Lintang (Lat. 5°44'33.62 N and Long. 102°39'22.84 E), the coastal waters of Besut, Terengganu was carried out on June and July 2010. *Stolephorus tri* are important component of marine ecosystems and commercially significant marine food resources in Malaysia. The mean size length of *Stolephorus tri* was 63.53 mm with a range of 51.0-76.0 mm. The average weight of *Stolephorus tri* was 1.57 g. The relationship between total length and body weight of *Stolephorus tri* was $\text{Log } W = 3.0384 \text{ Log } \text{TL} - 5.2923$ ($W = 0.00001 \text{ TL}^{3.0384}$). It is revealed that the exponent 'b' for *Stolephorus tri* was very close to the isometric value ($b = 3$). Therefore, the relative growth of *Stolephorus tri* was isometric in the coastal waters of Besut, Terengganu.

Key words: Anchovy, size frequency, Terengganu

INTRODUCTION

Spined anchovy, *Stolephorus tri* is a small silvery fish come from family Engraulidae (the anchovies and anchovetas). *Stolephorus tri* is the dominant genus by biomass in shallow habitats and especially important is *Stolephorus indicus*. Anchovies are small salt water fish (maximum size up to 20 cm) and prefer to the warmer waters around the world. The factors that limiting in the effective utilization of anchovies are their small size, the seasonal nature of the fishery forming gluts and their sensitivity to physical, time and temperature abuses (Shiriskar *et al.*, 2010).

Stolephorus tri are characterized by number of dorsal spine and anal spine and 17 to 18 anal soft rays. There is a short with origin below about middle of dorsal fin base. They also have a double pigment line on the back both before and behind the dorsal fin (Munroe and Nizinski, 1999). The economical important of the anchovies is as a harvest fishery species used as one of Malay dishes that are taken together with rice. Especially in Terengganu, the anchovies are used as main dish in '*Nasi lemak*' for breakfast. Ecologically, it also represents a critical component of marine and estuarine food webs, both as a predator and a prey species.

The economic importance of anchovies is quite well documented although in Malaysia the published information is negligible. In some of Asian countries such as Thailand, Indonesia, Philippines and also Malaysia, anchovies (though not of the same species) are consumed as one of the major sources of protein. There are no available information and study on spined anchovies

resources in Terengganu Malaysia coastal waters. This situation is caused by there are only small amount of product in term of landing. Besides, this anchovies is seasonal along the east coast coastal waters of Malaysia. Thus, the objectives of the present study were to determine the size frequency distribution of *Stolephorus tri* and to estimate the length-weight relationships of *Stolephorus tri* collected from the coastal waters of Terengganu, Peninsular Malaysia.

MATERIALS AND METHODS

Study site: The samples of anchovies were collected from Benting Lintang (Lat. 5°44'33.62 N and Long. 102°39'22.84 E), between the period from the February 2010 to April 2010 from the coastal water of Besut, Terengganu. The fresh samples of anchovies were taken from the fisherman. The local fishermen catch anchovies by using trawl net. Then the samples were immediately preserved in containers containing 5% formalin in the field and brought back to the laboratory for detail analysis. Identifications for *Stolephorus tri* was carried out based on the work of Mohsin and Ambak (1996).

Data analysis: A total of 200 samples of *Stolephorus tri* (spined anchovy) were measured and analyzed from the coastal waters of Besut, Terengganu. The total length and standard length were measured by means of a meter scale to the nearest millimeter and weighed by an electronic balance of 0.1 mg accuracy. The data were collected and arranged in the proper table presentation and analyzed by using Microsoft Office Excel and SPSS Software. The length-weight relationship was determined through the use of the general formula as $W = a L^b$, was applied (Ricker, 1975; Quinn and Deriso, 1999) where W represent the weight (g) and L represent the length (mm) of the fish, 'a' is intercept (condition factor) and 'b' is the slope (growth coefficient).

RESULTS AND DISCUSSION

Size frequency distribution: The size frequency distribution of *Stolephorus tri* is presented in Table 1. The mean total length of spined anchovy was 63.53±4.80 mm (Fig. 1) and the standard length was 54.46±4.27 mm. The maximum and minimum total length was 51.0 and 76.0 mm, respectively. The standard length showed the range values between 43.0 and 67.0 mm. The total length mode was 65.0 mm and the median was 64.0 mm. In terms of body weight, the mean was 1.57±0.36 g. The total body weight range was 0.72-2.57 g (Fig. 2).

Length-weight relationships: Parameters of the length weight relationship, growth constant (a) and relative growth rate or exponent (b) was calculated as 0.00001 and 3.0384, respectively. The equation for the length-weight relationship of *Stolephorus tri* from the coastal waters of Besut was established as below:

$$W = 0.00001 TL^{3.0384} \text{ or } \log W = 3.0384 \log TL - 5.2923$$

Table 1: Basis data for morphometric characteristics of *Stolephorus tri*

| Basic character | TL (mm) | SL (mm) | BW (g) |
|-----------------|-------------|-------------|------------|
| Mean | 63.53±4.801 | 54.46±4.267 | 1.57±0.364 |
| Median | 64.00 | 55.00 | 1.58 |
| Mode | 65.00 | 55.00 | 1.58 |
| Size range | 51.0-76.0 | 43.0-67.0 | 0.72-2.57 |
| N | 200 | 200 | 200 |

TL: Total length; SL: Standard length; BW: Body weight

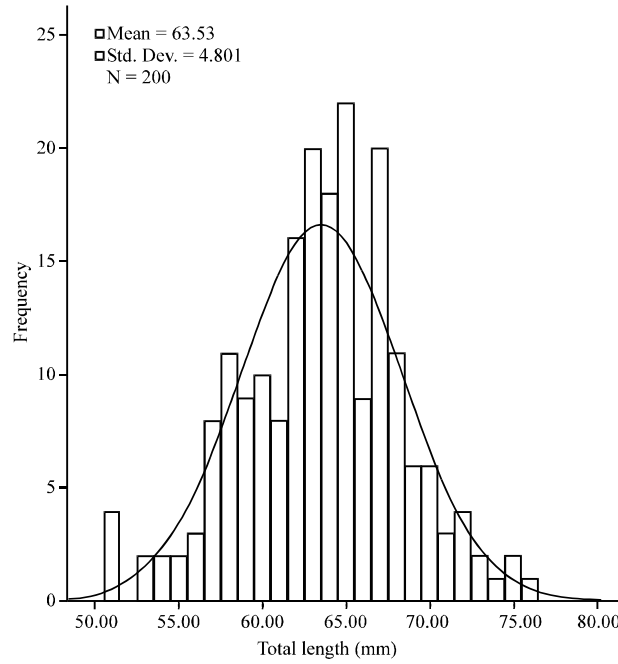


Fig. 1: Size frequency distribution of total length of *Stolephorus tri*

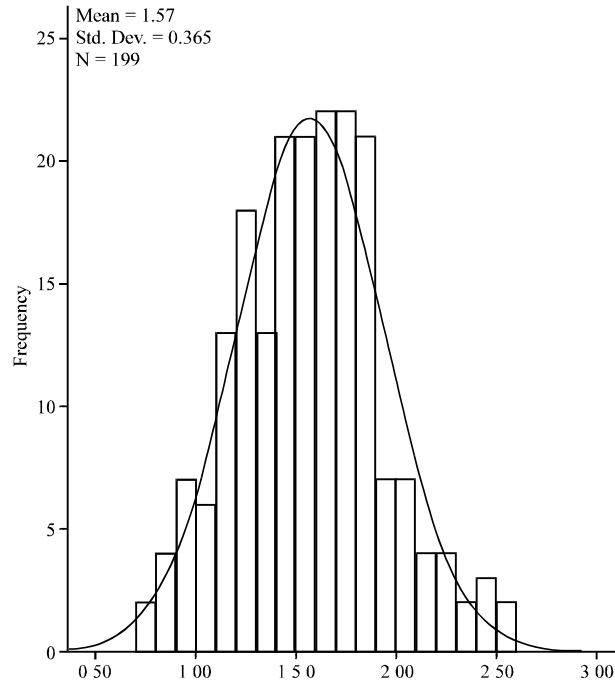


Fig. 2: Size frequency distribution of body weight of *Stolephorus tri*

Scattered diagram of the total length and body weight of *Stolephorus tri* is shown in Fig. 3 while linear chart was obtained by plotting the values of log total length against their log calculated weight (Fig. 4). Length-weight relationship is a concept of growth to be particular attention to the many fisheries biology scientists, such as Ecoutin and Albaret (2003), Ozaydin and Taskavah

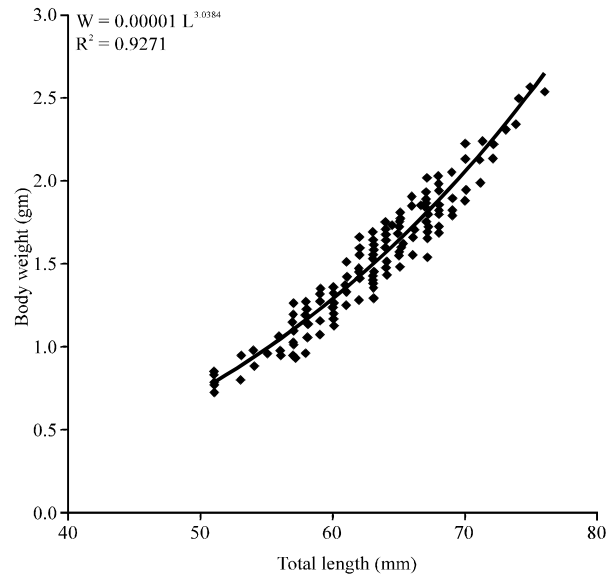


Fig. 3: Scatter diagram showing the relationship between total length and body weight of *Stolephorus tri* (Arithmetic scale)

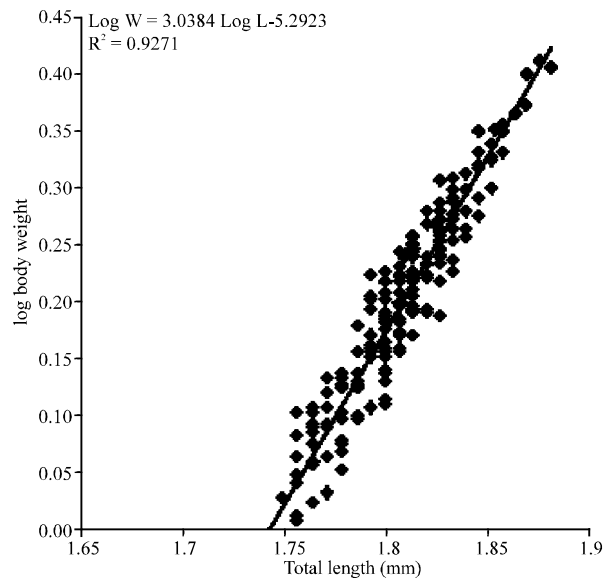


Fig. 4: Scatter diagram showing the relationship between length weights of *Stolephorus tri* (Logarithmic scale)

(2007), Amin *et al.* (2008, 2009), Ozcan and Balik (2009) and Lawson (2011). According to Ricker, 1975, 'b' values outside the range of 2.5-3.5 are generally erroneous. Hile (1936) and Martin (1949) showed that the exponent 'b' usually lies between 2.5 and 4.0. The 'b' values will be exactly '3' when the growth is isometric. According to Sinha (1972) the exponential value 'b' is supposed to be under the influence of numerous factors. So in the present case, the value of 'b' for *Stolephorus tri* was 3.0384 meaning that the exponent 'b' lay between the values mentioned by Hile (1936) and Martin (1949) and very near to the isometric value.

CONCLUSION

As a conclusion, the size of *Stolephorus tri* ranged between 51.0 and 76.0 mm. In terms of determination of length-weight relationships, the exponent value 'b' for *Stolephorus tri* was 3.0384. Thus, *Stolephorus tri* showed on isometric growth in the coastal waters of Besut Terengganu, Peninsular Malaysia.

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