

CUTTLEFISH, *SEPIA OFFICINALIS* L., 1758, IN THE TRAMMEL BOTTOM SET CATCHES ALONG THE EASTERN ADRIATIC COAST (CROATIA)

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Abstract

Length frequency distribution, sex ratio, length-weight relationship and frequency of occurrence (CPUE) of cuttlefish, *Sepia officinalis*, sampled from trammel bottom set catches in the eastern coastal Adriatic (Croatia) were analyzed. A total of 2105 specimens ($ML = 6.5 - 22.5$ cm, $W = 35 - 1800$ g) were measured in 428 positive trammel bottom set catches. Preliminary data on trammel bottom sets selectivity for six different "maha" mesh-size was also given.

Keywords: cuttlefish, trammel bottom set catches, eastern Adriatic

Introduction

Cuttlefish, *Sepia officinalis*, is one of the most abundant cephalopods species in the eastern coastal Adriatic, where it is commercially exploited all over the year (2-5). In early spring large individuals leave the deeper water, where they spend the winter, and migrate into shallower water owing to spawning (1-3, 5, 6, 8), when it is particularly abundant species in catches of some coastal fishing gears, i.e. benthic trawl, drift net and trammel bottom set. It is demersal, neritic species occurring predominantly on sandy to muddy bottoms from the coastline to about 100 m depth (2, 5-7), rarely deeper (8). In the Adriatic Sea, in spite of commercial value, its biology and ecology are poorly known (2-6). The aim of this study is to give some new information on length frequency distribution, sex ratio, length-weight relationship and frequency of occurrence of cuttlefish collected with trammel bottom sets in the eastern Adriatic.

Material and methods

Cuttlefish samples were collected in coastal water to cca 30 m depth by trammel bottom sets of 24, 28, 30, 32, 35 and 40 mm "maha" mesh-size from 1975 to 2000. A total of 2105 specimens were analyzed in 428 positive trammel bottom set catches. Mantel length (ML) was measured to the nearest 0.1 cm and weight (W) to the nearest 1 g. The commonly used length-weight relationship was applied: $W = a(ML)^b$. Differences in $ML - W$ relationship between sexes was tested by ANCOVA, and hypothesis of isometric growth by the t-test.

Results and discussion

Length frequency distribution: ML of total sample ranged from 6.5 to 25.5 cm ($\bar{x}ML = 11.70 \pm 2.8563$). ML of females ($N = 286$) ranged from 7.9 to 23.5 cm ($\bar{x}ML = 12.66 \pm 2.6490$) and of males ($N = 457$) from 7.5 to 22.5 cm ($\bar{x}ML = 11.53 \pm 2.5188$) (Fig. 1). Obtained mean ML of female cuttlefish was significantly larger than males (t-test, $t = 5.7887$; $p > 0.05$).

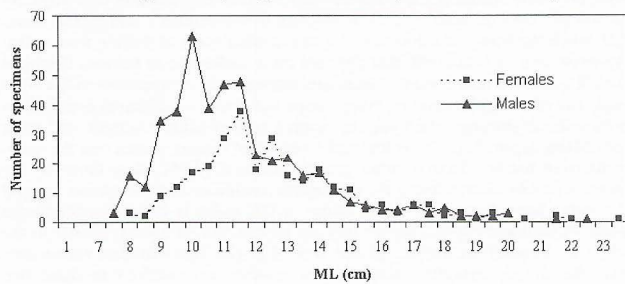


Fig. 1. *Sepia officinalis* - Length frequency distribution of males ($N = 457$) and females ($N = 286$).

Sex ratio: Sex was determined in 743 specimens; 286 were females and 457 were males, and sex ratio (males/females) was 1 : 1.60 in favour of males. A chi-square test revealed a significant departure from the theoretical 1 : 1 sex ratio ($\chi^2 = 39.36$, $Cv = 3.84$, $p > 0.05$).

Length-weight relationship: The weight of all sampled specimens ranged from 35 to 1800 g ($\bar{x}W = 222.0 \pm 184.142$). The range for males was from 55 to 1092 g ($\bar{x}W = 199.9 \pm 145.653$) and for females from 60 to 1200 g ($\bar{x}W = 267.15 \pm 181.104$). Obtained mean body weight of female cuttlefish was significantly larger than males (t-test, $t = 5.297$; $p > 0.05$). On account of this length-weight relationships were calculated separately for males, females and both sexes. The slopes (b values) of the total length-weight relationships, which differ significantly between sexes (ANCOVA, $p > 0.05$), indicate negative allometric growth for males, females and both sexes (Tab. 1). The value of b for males, females and both sexes were significantly different from 3.0 (t-test, $Cv = 2.576$): males $t = 9.402$, $p > 0.05$; females $t = 5.969$, $p > 0.05$; both sexes $t = 18.808$, $p > 0.05$.

Frequency of occurrence: In the trammel bottom sets the best cuttlefish catches (catch per one net, CPUE) down to 30 m depth were noticed during the spring and early summer (Fig. 2), which is in agreement with seasonal pattern of offshore-inshore migrations (1, 2, 5, 7, 8).

Table 1. *Sepia officinalis* - Parameters of the length - weight relationship ($W = aML^b$) for females, males and both sexes.

Sex	a	b	SE (b)	N	r ²
Females	0.2326	2.7307	0.03498	286	0.9280
Males	0.2443	2.6938	0.03965	457	0.9376
Both sexes	0.2366	2.7195	0.02558	2105	0.9405

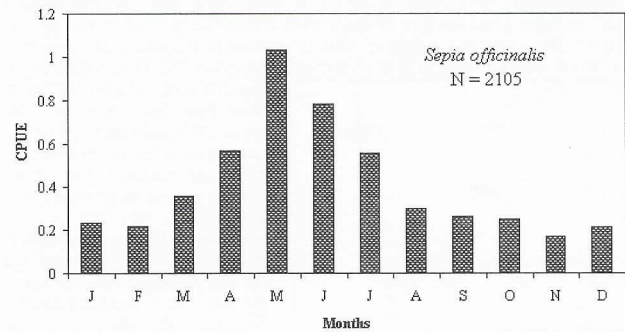


Fig. 2. *Sepia officinalis* - Frequency of occurrence (CPUE) in trammel bottom set catches.

Selectivity rate of trammel bottom sets: Preliminary data of selectivity rate of nets with different "maha" mesh-size were shown in Tab. 2. Calculated mean ML of cuttlefish are significantly different according to different mesh-size ($F = 23.22$, $Cv 0.221$, $p > 0.05$).

Table 2. *Sepia officinalis* - Preliminary data of trammel bottom set selectivity.

Mesh - size (mm)	N	ML (cm)		W (g)	
		Range	$\bar{x} \pm SD$	Range	$\bar{x} \pm SD$
24	364	6.5 - 21.0	11.03 \pm 2.9759	35 - 1050	200.6 \pm 172.56
28	1304	7.0 - 25.5	11.46 \pm 2.7076	35 - 1800	209.4 \pm 175.62
30	114	8.2 - 21.7	12.49 \pm 2.7261	65 - 872	254.2 \pm 161.15
32	67	8.5 - 21.3	12.70 \pm 2.6136	60 - 976	251.9 \pm 158.18
35	214	8.2 - 24.5	12.78 \pm 2.5711	40 - 1335	257.2 \pm 191.77
40	42	11.5 - 22.0	15.38 \pm 2.8393	190 - 985	426.1 \pm 216.34

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