

# DIFFERENCES IN REPRODUCTION CYCLE BETWEEN SARDINE *SARDINA PILCHARDUS* WALB. 1792 AND GILT SARDINE *SARDINELLA AURITA* VAL. 1847 IN THE MIDDLE EASTERN ADRIATIC

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## Abstract

This paper presents a comparison between reproduction cycle of sardine *Sardina pilchardus* and gilt sardine *Sardinella aurita* in the Adriatic Sea. Based on the greatest values of gonadosomatic index, sardine spawned from October to May, while gilt sardine reproduction started in June and lasted until September. The average cubic condition coefficient for sardine was  $K=0.7702 \pm 0.05$  and for gilt sardine  $K=0.7382 \pm 0.05$ .

*Keywords: Adriatic Sea, Reproduction, Fishes*

## Introduction

The aim of this study was to identify the differences between *Sardina pilchardus* and gilt sardine *Sardinella aurita* length, gonad and body weight, gonadosomatic index and condition factor in the Middle eastern Adriatic Sea. In the Adriatic Sea, sardine is one of the most abundant species, while gilt sardine is invasive and under-represented [1, 2].

Both fish specimens take the same ecological niche and are caught together by purse seines. They spawn at a completely different time of year and their condition values differ through the whole analyzed period.

## Material and methods

All of the fishes were obtained from the catches of inshore (Virsko more) and offshore waters (Dugi Otok) in the Middle eastern Adriatic Sea, from March 2004 to January 2009. A total of 1,219 sardine and 2,033 gilt sardine specimens were measured to the nearest mm and weighed to the nearest g. The monthly gonadosomatic index (*GSI*) was calculated by the monthly gonad weight (*Wg*) as a proportion of the total body weight (*W*):  $GSI = 100 Wg / W$ . The cubic condition factor (*K*) was calculated using Fulton's coefficient  $K = 100WL^{-3}$ . To avoid the bias caused by fish size (*L*) in the condition analysis, only sardines between 14.0 and 18.0 cm, and gilt sardines from 18.0 to 28.0 cm *LT* were used to compare condition changes.

## Results

Sardine and gilt sardine total lengths and body weights ranged from 13.0 to 19.0 cm (mean=16.0 ± 0.9 cm) and from 16.7 and 51.5 g (mean=31.5 ± 5.3 g), then from 10.0 to 32.5 cm (mean=22.0 ± 3.7cm) and from 6.43 to 298.32 g (mean=85.77 ± 37.5 g), respectively. Sardine *GSI* showed greatest value in July (3.38%) and lowest in February (0.37%). Gilt sardine *GSI* ranged from 0.41%-July to 4.32%-December (Fig. 1).

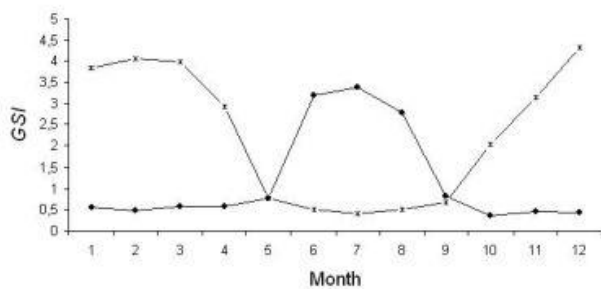


Fig. 1. GSI of sardine (\*) and gilt sardine (•), Middle eastern Adriatic Sea, 2004-2009

The average cubic condition coefficient (*K*) of sardine varied from 0.6939 (January) to 0.8282 (September) (mean  $K=0.770 \pm 0.05$ ), and of gilt sardine from 0.6515 (February) to 0.8025 (January) (mean  $K=0.738 \pm 0.05$ ) (Table 1).

Tab. 1. Average monthly cubic condition factor (*K*) of sardine and gilt sardine from the catch samples of the Middle eastern Adriatic Sea, 2004-2009

Month	Cubic condition factor <i>K</i>	
	<i>S. aurita</i>	<i>S. pilchardus</i>
January	0.8025	0.6939
February	0.6515	0.7149
March	0.6915	0.7618
April	0.7202	0.7561
May	0.7099	0.7627
June	0.7744	0.8375
July	0.7165	0.7848
August	0.7657	0.8215
September	0.7544	0.8282
October	0.7570	0.7848
November	0.7981	0.7266
December	0.7175	0.7698
mean	0.7382	0.7702
SD	0.045	0.045

## Discussion

According to this study there were differences between sardine and gilt sardine spawning season and its duration. Sardine spawns during the winter months (from October to May), whereas gilt sardine spawns in summer (from June to September) [3]. Gilt sardine spawning period lasts longer in warmer waters compared to the ones with a lower average temperature [1, 4, 5].

In general, sardine showed greater values of cubic condition factor during summer months than during the winter (spawning) period. Condition of gilt sardine was also better after spawning (October-November); its greatest value was noticed in January ( $K=0.803$ ).

## References

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