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# The Maximum Length Record of the White Seabream (*Diplodus sargus* Linnaeus, 1758) for the Aegean Sea

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**ABSTRACT**

A single specimen of *Diplodus sargus* with 40.5 cm in total length and 1000.00 g in total weight was caught off İbrice Bight (Saros Bay) with handline by a commercial fisherman on 25 June 2018. The mentioned sizes are the maximum length and weight values of the species for the Aegean Sea and the other Turkish coasts; however, it is the second-largest length ever reported in the Mediterranean Basin.

## INTRODUCTION

The white seabream (*Diplodus sargus* Linnaeus, 1758) is an important demersal commercial sparid found throughout the Mediterranean Sea (Fischer *et al.*, 1987), eastern Atlantic from Canary Islands and Madeira north to France (Fishbase, 2020) (Figure 1), especially inhabiting rock, sand and seagrass beds (Vigliola & Harmelin-Vivien, 2001). This species congregate in schools of 5-50 individuals and feed mainly on molluscs (Rosecchi, 1987). Juveniles usually live in coastal lagoons and estuaries (<2 m) (Quignard & Man-Wai, 1983; Macpherson, 1998). The white seabream is mostly caught by long lines;

although sometimes it is caught by trammel nets and gill nets (Mahmoud *et al.,* 2010). Because of its economic value, although there are various studies on *Diplodus sargus* all over the World (Girardin, 1978; Man-Wai & Quignard, 1984; Man-Wai, 1985; Wassef, 1985; Rosecchi, 1987; Harmelin et al., 1995; Gordoa & Moli, 1997; Sala & Ballesteros, 1997; Macpherson et al., 1997; Macpherson, 1998; Planes et al., 1999; Gonçalves, 2000; Vigliola & Harmelin-Vivien, 2001; Mariani, 2001; Lanfant, 2003; Morato et al., 2003; Mouine et al., 2007; Abacesis et al., 2008; Benchalel & Kara, 2010; Benchalel et al., 2010; Mahmoud et al., 2010; Benchalel & Kara, 2012; Al-Beak et al., 2017), there is one study about biological parameters of this species (Balık & Emre, 2016), except of its length-weight relationships in the Turkish seas.

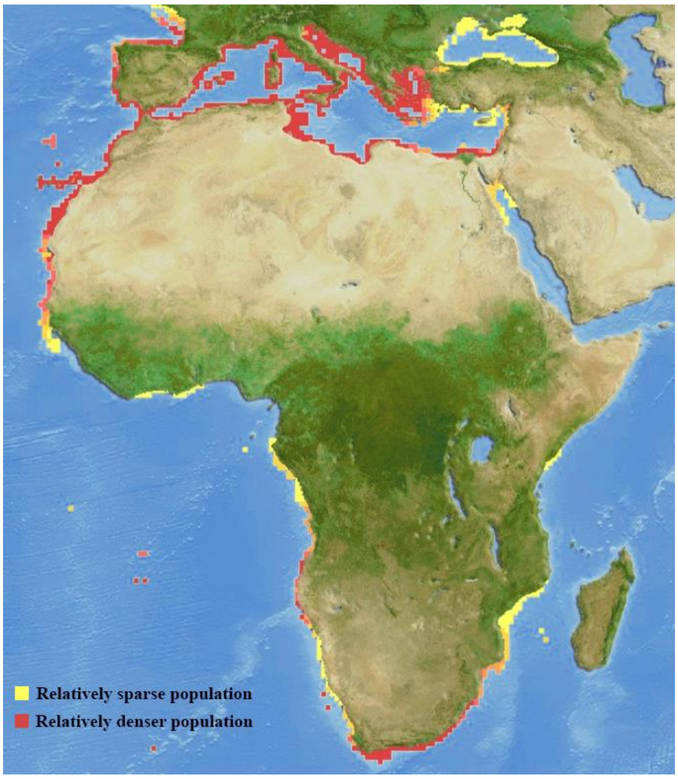


**Figure 1.** Geographic distribution of *Diplodus sargus* (modified from Fishbase, 2020)

The maximum length and weight are important parameters used in life-history studies and fishery science (Dulčić & Soldo, 2005) and these measurements are applied directly or indirectly in most stock assessment models (Legendre & Albaret, 1991; Borges, 2001). Especially, the size-based analyses of marine animals are becoming increasingly popular methods for improving the understanding of community structure and function (Jennings & Dulvy, 2005) and could be used as a tool for rapid evaluation of growth rates in the absence of primary data (Froese & Binohlan, 2000; Filiz & Sevingel, 2015). Therefore, it is necessary to regularly update the maximum size of commercially important species (Navarro et al., 2012). Accurate estimates of the maximum size of fish in a population are essential for biologists and ecologists because biological rates and ecological functions are size-specific (Peters, 1983; Pope et al., 2005). For example, metabolic rate is inversely related to body size, whereas total food intake is positively related to body size. Size at hatch, size at sexual, maturation and longevity are directly related to the maximum size of fishes (Freedman & Noakes, 2002; Van der Veer et al., 2003). However, the maximum length or weight is a key component in many fishery models, such as the von Bertalanffy and Gompertz growth models (Quinn & Deriso, 1999). The given size is the maximum length and weight values of the species for the Aegean Sea; however, it is the second-largest length ever reported in the Mediterranean Basin.

## MATERIAL AND METHOD

Saros Bay, which is situated in the Northeastern Aegean Sea, is connected to the North Aegean with a depth of approximately 600 m to the west. The shelf extends at a water depth of 90-120 m. The length of the bay is about 61 km, and the width at the opening to the Aegean Sea is about 36 km (Eronat & Sayın, 2014). As Saros Bay had been closed to bottom trawl fishing since 2000 (Cengiz et al., 2011; 2019a) and no industrial activity was prevalent in the area (Sarı & Çağatay, 2001), the bay can be considered as a pristine environment (Cengiz et al., 2013).

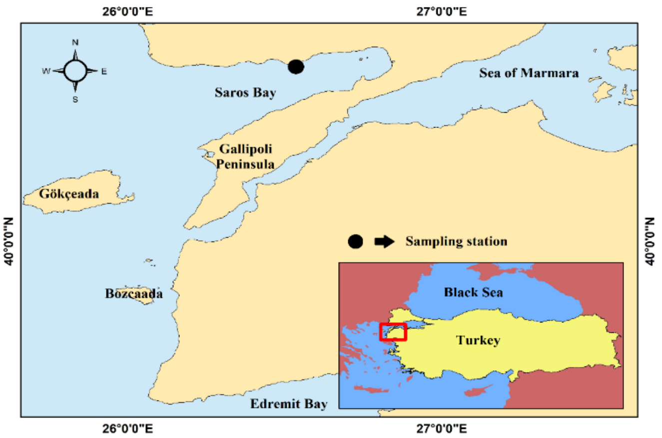


**Figure 2.** Saros Bay (Northern Aegean Sea, Turkey) and sampling station

A single specimen of *Diplodus sargus* was caught off İbrice Bight (Saros Bay, Northern Aegean Sea) (Figure 2) with handline by a commercial fisherman from a depth of 15 m depth on 25 June 2018. Subsequently, we obtained it from a fishmonger in Çanakkale. Total length is defined as the measurement taken from the anterior-most part of the fish to the end of the caudal fin rays when compressed dorso-ventrally (Anderson & Gutreuter, 1983). Consequently, the total length and weight of the specimen was measured carefully. Additionally, some morphometric characters (according to Figure 3) were measured, and some meristic characters were determined.

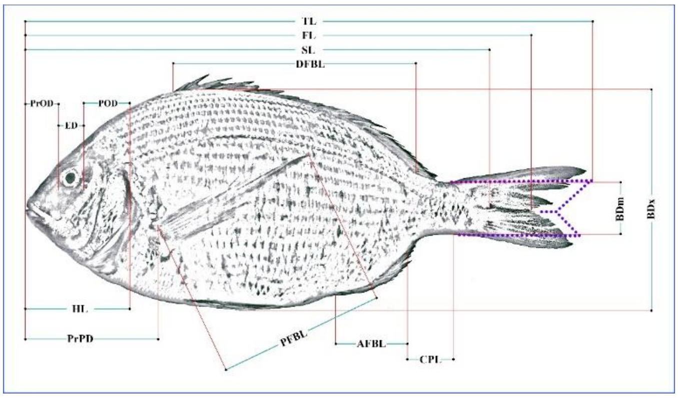


**Figure 3.** Morphometric measurements of the white seabream (Abbreviations: TL – total length, FL – fork length, SL – standard length, HL – head length, PrOD – preorbital distance, ED – eye diameter, POD – postorbital distance, PrPD – prepectoral distance, DFBL – dorsal fin base length, PFBL – pectoral fin base length, AFBL – anal fin base length, CPL – caudal peduncle length, BDm – minimum body depth, BDx – maximum body depth)

## RESULTS

Captured white seabream was 40.5 cm in total length (TL) and 1000.00 g in total weight (TW) (Figure 4). Some morphometric and meristic characters are presented in Table 1. The comparison of the previous maximum length and weight values for *Diplodus sargus* in the Mediterranean Basin is given in Table 2.

**Figure 4.** The white seabream with 40.5 cm TL and 1000.00 g TW

**Table 1.** Some morphometric and meristic characters of the *Diplodus sargus* specimen discussed in this study

| Morphometric Characters | Value |
|---|---|
| Weight (g) | 1000.0 |
| TL (mm) | 405.0 |
| FL (mm) | 372.6 |
| SL (mm) | 342.0 |
| BDm (mm) | 33.7 |
| BDx (mm) | 158.9 |
| HL (mm) | 76.0 |
| PrOD (mm) | 26.7 |
| ED (mm) | 13.7 |
| POD (mm) | 35.6 |
| PrPD (mm) | 99.0 |
| DFBL (mm) | 169.3 |
| PFBL (mm) | 128.9 |
| AFBL (mm) | 57.6 |
| CPL (mm) | 40.4 |
| **Meristic Characters** | |
| Dorsal fin rays | XI - 12 |
| Anal fin rays | III - 11 |
| Pectoral fin rays | 13 |
| Lateral line scales | 63 |

## DISCUSSION

Size structure and maximum size of individuals within fish populations are influenced by several abiotic, biotic, and anthropogenic factors (VanderBloemen et al., 2020). If a fish population in any ecosystem is exposed to overfishing, fish sizes will gradually be smaller over time. Therefore, individuals who are not subjected to overfishing could reach such a length (Filiz, 2011). However, the factors affecting growth could state as nutrient availability, feeding, light regime, oxygen, salinity, temperature, pollutants, current speed, nutrient concentration, predator density, intra-specific social interactions and genetics (Helfman et al., 2009; Acarli et al., 2018). It follows from these comments that the regional differences in maximum length and weight depend on the ecological conditions and overfishing pressure.

In the Mediterranean Basin, the maximum length and weight values have been reported to be 42 cm (TL) and 1700.00 g (TW) by Man-Wai & Quignard (1984) in the Gulf of Lion. The Mediterranean Sea is considered to be one of the most impoverished marine regions (Mazzocchi et al., 1997). Within the Mediterranean Sea, there exists a west-east gradient (Krom et al., 1991; Dolan et al., 1999; Turley et al., 2000): the Eastern Mediterranean has been identified as one of the most oligotrophic areas of the world (Azov, 1986; Souvermezoglou et al., 1992; Krom et al., 1993; Zohary & Robarts, 1998). The Aegean Sea is a

**Table 2.** The comparison of the previous maximum length and weight values for *Diplodus sargus* in the Mediterranean Basin

| Authors | Area | N | $L_{max}$ (cm) | $W_{max}$ (g) |
|---|---|---|---|---|
| Man-Wai & Quignard (1984)* | Gulf of Lion | 1684 | 42.0 | 1700.00 |
| Gordoa & Moli (1997) | Catalan coast, North-Western Mediterranean | 184 | 39.0 | - |
| Moutopoulos & Stergiou (2002) | Cyclades, Greece | 19 | 32.3 | - |
| Karakulak et al. (2006) | Gökceada Island, Turkey | 2 | 15.3 | 56.20 |
| Ceyhan et al. (2009) | Gökova Bay, Turkey | 33 | 32.3 | - |
| Gürkan et al. (2010) | Candarli Bay, Turkey | 22 | 4.4 | 1.09 |
| Mahmoud et al. (2010) | Abu Qir Bay, Egypt | - | 27.5 | - |
| Bilge et al. (2014) | Southern Aegean, Turkey | 83 | 27.3 | - |
| Altın et al. (2015) | Gökceada Island, Turkey | 530 | 23.1 | 222.00 |
| Balık & Emre (2016) | Beymelek Lagoon, Turkey | 355 | 28.7 | 481.00 |
| Al-Beak et al. (2017) | East of North Sinai, Egypt | 991 | 38.0 | 840.00 |
| Kara et al. (2017) | Gediz Estuary, Turkey | 73 | 12.3 | 31.90 |
| This study** | Saros Bay, Turkey | 1 | 40.5 | 1000.00 |

***Note:*** * maximum length and weight values for the Mediterranean Basin.

** maximum length and weight values for the Aegean Sea and the other Turkish coasts, however, it is second largest record for the Mediterranean Basin.

distinct sub-system of the Eastern Mediterranean Sea due to its geographical position between the Black Sea and the other seas of the eastern basin (Ionian & Levantine Seas) (Siokou-Frangou et al., 2002). The Aegean Sea has a complex topography (Olson et al., 2007), and it displays considerable physiochemical variations between north and south (Zervakis & Georgopoulos, 2002). The nutrient concentrations, plankton and benthos abundance, as well as fish catch densities, have been found higher in the North-Northwest Aegean Sea than in the South-Southeast Aegean Sea (Stergiou et al., 1997). Furthermore, the Black Sea surface outflow in the Northeast Aegean Sea has been found to be enriched in dissolved organic carbon and dissolved organic nitrogen (Polat & Tuğrul, 1996). Therefore, the South Aegean Sea has been recently characterised as one of the most oligotrophic areas of the Mediterranean Sea (Ignatiades, 1998; Gotsis-Skretas et al., 1999; Van Wambeke et al., 2000; Psarra et al., 2000).

## CONCLUSION

In broad terms, the information of maximum length, weight, age, growth and weight-length relationships are required to estimate the population parameters as asymptotic length and growth coefficient of fish, which is essential for fisheries resource planning and management (De la Cruz-Agüero et al., 2010). For these reasons, this information is constantly updated both in Turkey [(*Pagellus bogaraveo*, (Paruğ & Cengiz, 2020), *Alectis alexandrina*, (Akyol & Çoker, 2019); *Argyrosomus regius* (Tokaç et al., 2017); *Belone belone* (Acarli et al., 2018); *Boops boops* (Ceyhan et al., 2018); *Chelidonichthys lucerna* (Akyol, 2013; Hasimoğlu et al., 2016; Özdemir et al., 2019); *Diplodus annularis* (Cengiz et al., 2019b); *Diplodus puntazzo* (Aydın, 2019; Cengiz, 2019a); *Diplodus vulgaris* (Cengiz et al., 2019c); *Gonostoma denudatum* (Ayas et al., 2020); *Fistularia commersonii* (Koç et al., 2019); *Lithognatus mormyrus* (Aydın, 2018a; Cengiz, 2019b); (*Mullus barbatus* (Filiz, 2011); *Mullus surmuletus* (Cengiz, 2019c); *Oblada melanura* (Akyol et al., 2014; Cengiz, 2020a); *Phycis phycis* (Filiz & Sevingel, 2014); *Pomatomus saltatrix* (Cengiz, 2014; Bal et al., 2018); *Sardina pilchardus* (Cengiz & Sepil, 2018); *Sciaena umbra* (Cengiz et al., 2019d); *Symphodus melops* (Aydın, 2020); *Solea solea* (Cengiz, 2018a); *Sparisoma cretense* (Filiz & Sevingel, 2015); *Sparus aurata* (Aydın, 2018b; Cengiz, 2018b); *Spicara maena* (Cengiz, 2020b); *Spondyliosoma cantharus* (Cengiz, 2018c); *Stephanolepis diaspros* (Akyol et al., 2018); *Umbrina cirrosa* (Cengiz & Paruğ, 2021)] and in the World [(*Anguilla anguilla* (Tutman et al., 2007); *Ariopsis gilberti*, *Ariopsis guatemalensis*, *Cathorops liropus*, *Cathorops raredonae* (Palacios-Salgado et al., 2018); *Bagarius yarrelli* (Hossain, 2010); *Balistes capriscus* (Dulčić & Soldo, 2005); *Belone belone* (Dulčić & Soldo, 2006); *Corica soborna*, *Mystus bleekeri* (Hossain et al., 2017); *Esox masquinongy* (VanderBloemen et al., 2020); *Mobula cf. hypostoma* (Ehemann et al., 2017); *Macrohamphosus scolopax* (Borges, 2001); *Notarius troschelii* (De la Cruz-Agüero et al., 2010); *Scardinius erythrophthalmus* (Šprem et al., 2010); *Scardinius dergle*, *Scardinius hesperidicus* (Valić et al., 2013); *Scomber colias*, *Scomber scombrus* (Navarro et al., 2012)]. Consequently, this paper provides new data on the maximum observed length of *Diplodus sargus* for the Aegean Sea and the other Turkish coasts, and the second-largest length for Mediterranean Basin. The information presented here may be used to compare the similar parameters in ongoing fishery studies all over the world by providing scientific support to the fisheries scientists.

## Compliance with Ethical Standards

### Authors' Contributions

Both authors have contributed equally to this paper. Both authors have read and approved the final version of the manuscript.

### Conflict of Interest

The authors declare that there is no conflict of interest.

## Ethical Approval

For this type of study, formal consent is not required.

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