# Gilthead sea bream, *Sparus aurata*

## Life cycle

Gilthead sea bream (Dorado, Chipura, Deniz) is a marine fish and a member of the Sparidae family. The species is common across the Mediterranean Sea, the Black Sea and the east Atlantic Ocean, inhabiting rocky and sandy bottoms in shallow waters, usually up to 30 meters depth. These fish are carnivorous, feeding mostly on shellfish, including mussels and oysters. They are euryhaline, therefore can tolerate wide range of salinities. Juveniles are often found in shallow coastal and brackish waters, and adults swim toward the deeper waters to breed.

Spawning season lasts for two-three months, between October and February (depends on the location). This species is a Protandrous Hermaphrodite. Fish mature as males during their first and second years and most individuals change their sex to female between the second to the fourth year of their life. The fish are iteroparous (will have multiple spawning cycles after achieving maturity) and daily spawners. A single female will spawn between 20,000 to 80,000 eggs per day during its spawning period. Egg size is approximately 0.9 millimeter in diameter and contains a single oil droplet. Fertilization occurs in the open waters and floating eggs are fertilized immediately after spawning. Incubation period (at 17-18 ˚C) is ~48 hours.

A single yolk-sac larva hatches from each egg. The larvae feed exclusively on their stored yolk during the first two-four days post hatching. After absorbing their yolk sac, larvae feed on plankton and gradually start feeding on larger prey.

## Aquaculture

Sea bream has been cultured for centuries across the Mediterranean Sea using traditional methods as *Hosha* (Egypt), *Esteros* (Spain) and *Valliculture* (Italy). All methods depended on stocking of wild “seed” (fry) and culturing them until harvest. These types of extensive, captured-based aquaculture operations were sufficient and managed to supply the modest demand. This had all changed during the 1960’s and the 1970’s. The decreasing supply of wild fingerlings, due to changes in coastal habitats, pollution, over-fishing, etc., along with the increasing demand for fingerlings threatened to destroy the industry. Moreover, more intensive culture methods could not be developed without the proper supply of fingerlings. Governmental research centers that were established across the Mediterranean started to work on the artificial propagation of sea bream. Successful results were reported between the early 70’s to the early 80’s in Israel, France, Italy and Spain. These breakthroughs led to the establishment of commercial breeding centers and farming operations.

Today, sea bream is the most cultured fish in the Mediterranean Sea and one of the most important species in Mariculture. Total world production for 2013 was 173,062 ton (Fig. 1). The major producers are (tons): Greece (73,330), Turkey (35,701), Spain (18,897) and Egypt (14,537). Most of the production (92%) takes place in sea pens and the rest is produced inland.

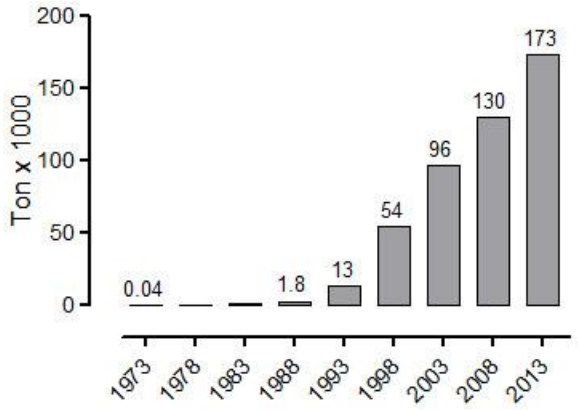


**Figure 1.** Total production of Gilthead sea bream. Numbers above bars are production in kilo-ton (source: FAO).

## Research

First successful breeding trails were reported in France, Italy and Israel during the 1970’s (Lumare and Villani, 1973; René, 1974). On 1975 the National Center for Mariculture, Eilat, Israel, reported successful breeding of broodstocks brought form Lake Bardawil in Sinai, and by the late 1970’s full closer of the life cycle was obtained. Until the early 80’s, full closer of the species life cycle was also reported from France, Spain, Italy, Greece and Portugal.

During those early years of Mediterranean Mariculture, the research effort was mainly focused on reproduction (Gordin et

al., 1978; Zohar et al., 1978) and larval rearing (Tandler and Helps, 1985). In the years to come, studies in the fields of genetics (Knibb, 2000), pathobiology (Colorni, 1987), nutrition (Kissil et al., 2001) and engineering (Timmons and Ebeling, 2010), as well as practical guides (e.g. Moretti et al., 1999, 2005), provided most valuable information to support the growing industry. In addition to the direct research supporting sea bream mariculture, the species became an important "laboratory", or "model" fish. Sequencing the gonadotrophic hormones regulating reproduction (Elizur et al., 1996), endocrinology (Zohar et al., 2010), cryo-preservation of embryos (Babin et al., 2007) and recirculated systems (van Rijn, 2006; van Rijn et al., 2013) are only few examples for studies of great importance to the development of mariculture, as well as to other scientific fields. Advances in sea bream research and culture are gathered in a book edited by Michail Pavlidis and Constantinos Mylonas (2011) titled '*Sparidae: Biology and aquaculture of gilthead sea bream and other species*'.

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