

European seabass, *Dicentrarchus labrax*

Life cycle

European seabass (lubina, loup, labrak, lavrek, robalo) is a marine fish and a member of the Moronidae family. This pelagic fish is common across the Mediterranean Sea and the east Atlantic Ocean, from Senegal to Norway. Named the 'sea wolf', these fish are famous for their aggressive feeding behavior. Seabasses are euryhaline, and tolerate wide range of salinities, from marine environments to freshwater (Pickett and Pawson, 1994). They are also temperature tolerant (eurythermic) and can swim in temperatures as low as 4 °C and up to 30 °C, although their preferred range is 12-22 °C.

European seabasses are gonochoristic and juveniles differentiate to males and females without the ability to change their sex post maturation. Sexual determination is temperature dependent. Lower temperatures (13-15 °C) during early development result in female differentiation and higher temperatures (19-22 °C) have a masculinizing effect (Piferrer et al., 2005). Spawning season lasts for two-three months, between December and March (Until June in the Atlantic). A female will spawn between one to a few batches of eggs a season. Total eggs spawned can reach 300,000 eggs per one kg of body weight. Eggs are between 1.0 – 1.5 mm in diameter (Javier Sánchez Vázquez and Munoz-Cueto, 2014).

A single yolk-sac larva hatches from each egg. The larvae feed exclusively on their stored yolk during the first two-five days post hatching. After absorbing their yolk sac, larvae feed on plankton and gradually start feeding on larger prey. Small fry feed on copepods and small invertebrates; larger fingerlings feed on shrimp and small fish; and adults, which are positioned high in the food web, feed on smaller fish and invertebrates. Cannibalism was well documented during the early stages (post larvae and fry). Common in commercial hatcheries when size grading is not properly done (Katavić et al., 1989), and reported from wild populations when there is sufficient wide size range (Henderson and Corps, 1997).

Aquaculture

Seabass has been cultured for centuries across the Mediterranean Sea using traditional methods as *Esteros* (Spain) and *Valliculture*

(Italy). These methods depended on stocking of wild "seed" (fingerlings) and culturing them until harvest. During the 1960's and the 1970's the decreasing supply of wild fingerlings threatened to destroy the industry. Moreover, more intensive culture methods could not be developed without the proper supply of fingerlings.

Following research efforts since the late 1960's (mainly in France and in Italy), and after developing hatchery production techniques, commercial operations (in France, Italy, Spain, Greece and Israel) were established during the mid 1980's. Between the late 1980's and the early 1990's hatchery production became stable. This steady supply of fingerlings, along with the high market demand, led to an impressive grow in seabass production.

Today, seabass is widely cultured across the Mediterranean Sea and one of the most important species in Mariculture. Total world production for 2013 was 161,059 ton (Fig. 1). The major producers are (tons): Turkey (67,913), Greece (48,600), Spain (14,945) and Egypt (12,328). Similar to sea bream, 92% of the yield is produced in sea pens.

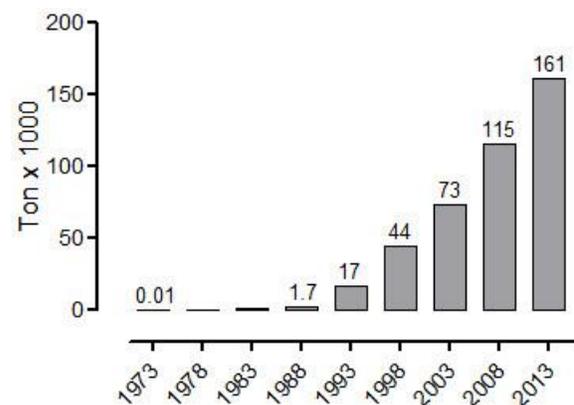


Figure 1. Total production of European seabass. Numbers above bars are production in kilo-ton (source: FAO).

Research

France and Italy led the artificial propagation trails, and first breakthroughs were reported during the early 1970's (Barnabé and René, 1972; Lumare and Villani, 1973; Barnabé, 1974). Research effort continued, especially in the fields of reproduction and larval rearing (Devauchelle and Coves, 1988a, 1988b; Lubzens et al., 1989; Carrillo et al., 1989; Mananós et al.,

2002; Rainis et al., 2003), enabling the establishment and growth of commercial operations.

In the years to come, seabass differential growth rate has drawn major scientific attention. Female seabass grow faster than males, and at marketing size (~ two years old) body weight differences between the sexes can reach 30% (Blázquez et al., 1999; Saillant et al., 2001; Gorshkov et al., 2004). Yet, hatchery produced fingerlings are mostly males, due to common practice and the abovementioned temperature influence on sexual determination. Several works attempted to characterize the physiological mechanism underlining this phenomenon and to suggest efficient methods for elevating female ratios (Blázquez et al., 1995; Papadaki et al., 2005). The work on this exiting topic continues.

Seabass research has wide implications and is not limited solely to mariculture. Studies on two of its physiological characteristics, osmoregulatory abilities (Tine et al., 2014) and the influence of temperature on its sexual differentiation, has been contributing to both the mariculture industry (Blázquez et al., 1998), and to other biological fields, such as epigenetics (Piferrer, 2013).

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