

Sardinella aurita (Sardine or Round Sardinella)

Family: Clupeidae (Sardines and Herrings)

Order: Clupeiformes (Sardines, Herrings and Anchovies)

Class: Actinopterygii (Ray-finned Fish)



Fig. 1. Sardine, *Sardinella aurita*.

[<http://www.marinespecies.org/photogallery.php?album=742&pic=2314>, downloaded 22 March 2015]

TRAITS. The sardine (*Sardinella aurita*) has a sub-cylindrical elongated body, flattened sideways and with a rounded belly (Fig. 1). The length of sardines is generally 12-15cm at maturity, but can reach up to 28cm in some instances, being one of the largest *Sardinella* species, and can weigh almost 230g. The large reflective scales that cover their bodies are silver in colour, deciduous (easily lost) and smooth. On the top of the head is a golden, faint mid-lateral line, and also on the gill cover is a black distinct spot. A typical clupeid mouth shape is visible in these fish, with a short but deep lower jaw. Sardines also possess deeply forked tails.

DISTRIBUTION. *Sardinella aurita* is native to many parts of the world like Africa, Europe, North (including Trinidad and Tobago) and South America. However, its distribution occurs mainly in two regions, the eastern Atlantic (Mediterranean) and the western Atlantic (Fig. 2).

HABITAT AND ACTIVITY. Pelagic fishes like sardines are found on both sides of the Mediterranean Sea and Atlantic Ocean. They prefer clear saline water with favorable temperatures of below 24°C. There was a marked increase in sardines from south of the western Mediterranean basin to the north during the period of 1989-2004, associated with an increase in water temperatures. This migration to south during winter and north during summer also signified the commencing of gonad maturation of these fishes (Sabatés et al. 2006). Therefore sardines can be described as being strongly migratory. Additionally sardines swim near the surface of water and travel in large groups as a defence mechanism against predators (Fig. 3). Young sardines stay closer to shore so that they can feed and later re-join adult sardines when they are fully developed and can therefore hide from predators, travel long distances during cold seasons and search for food independently. They are considered diurnal. Since these fishes are

migratory, they may travel distances of more than 1000km between feeding and spawning habitats over the course of a year.

FOOD AND FEEDING. According to Komarovskiy (1959) the feeding patterns of sardines depend mainly on the season as well as the availability and constituents of their food supply. Phytoplankton and zooplankton were the main foods ingested by sardines; the larger the sardine the greater the density of plankton found in their stomach. One advantage that sardines have in obtaining food is the two mechanisms they can use (Madkour, 1992). The first mechanism is known as filter-feeding, this is process where water is filtered through their gills; both phytoplankton and zooplankton can be obtained. This mechanism is more energy efficient instead of the other mechanism, their normal selective feeding mode. Gibson et al. (2009) state that during the fishing season (April-October) while the sardines feed throughout the day, the largest feeding occurred at dusk (4-6 p.m.) where the intensity of the sunlight decreased making it easier to feed and reduced chances of falling prey.

POPULATION ECOLOGY. Most *Sardinella aurita* live for approximately 7-8 years and are typically found in schools (the collective name given to a group of fish), usually made up of fish of approximately the same age and length. Since these fish do not have a restricted habitat they often migrate seasonally, and travel together in groups of thousands or millions to escape predators.

REPRODUCTION. At approximately one year sardines reach sexual maturity. Fréon et al. (2007) explain that reproduction in sardines is related to the availability of food, that is the presence of large quantities of plankton. The stored lipids in these fish provide the energy requirement for gamete production. Although spawning takes place continuously throughout the year, there are two major spawning peaks which can also be determined by the migratory patterns of the sardines. Approximately 50 eggs are produced in one spawning and since there are two major spawning peaks for the year, at least 100 eggs can be produced per year. It can be noted that males are generally smaller than females and reach sexual maturity faster. Both male and female reproductive cells are laid in shallow water. If fertilization is successful, survival depends significantly on marine conditions. Eggs sizes can range from 1-1.25 mm and takes approximately 3 days to hatch.

BEHAVIOUR. In an analysis of the behavioral patterns of *Sardinella aurita* in Venezuela and Senegal, several factors influenced the shape of the large schools, as shown by different echo types (Brehmer et al., 2007). The behaviour of these fish can be influenced by many stimuli for example light, sound, and predators. The defence mechanism of sardines against predators is to camouflage themselves underwater; this method is known as cryptic coloration (Tsikliras et al., 2004). Cryptic coloration gives the organism the ability to blend in with its surroundings, therefore disguising its shape and is less vulnerable to predators since they are difficult to see. Cryptic coloration is in many animals, like sardines, the first line of defence. Another defence mechanism against predators is that sardines stay close to the sea floor or the edge of the continental shelf.

APPLIED ECOLOGY. *Sardinella aurita* is not red listed by the IUCN and hence is not endangered or under threat of becoming extinct and therefore does not require significant methods of conservation to date. Humans depend greatly on sardines as a form of food, which is inexpensive and readily available. They have excellent nutritional value; high in proteins, omega

3 fatty acids and vitamin D3 to name a few. As a result of this their numbers must be carefully monitored since the demand is high.

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Fig. 2. *Sardinella aurita* distribution; red represents higher occurrence and yellow a lower occurrence.

[http://www.aquamaps.org/receive.php?type_of_map=regular, downloaded 1 April 2015]



Fig. 3. A school of sardines.

[http://www.divetime.com/photos/Featured/Henry_Jager/Sardine_Tornado_11456.html, downloaded 1 April 2015]