

ORIGINAL PAPERS

Reproduction Activity of Flathead Mullet *Mugil cephalus* (Linnaeus, 1758) in Wild Condition in the Northeast of Algeria¹

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Abstract—The objective of the present study was to investigate variations in sperm parameters of wild *Mugil cephalus* (known as flathead grey mullet) during its natural spawning season in 2015, in addition to the conventional indices, gonadosomatic and hepato-somatic indices (GSI and HSI) and condition factor (*K*) in male and female *Mugil cephalus* from July 2014 to December 2015. Sperm motility was assessed by a Computer-Assisted Sperm Analysis (CASA) measuring Curvilinear Velocity (VCL), Straight Line Velocity (VSL), Average Path Velocity (VAP) and Linearity (LIN). Based on GSI, the results demonstrated that *M. cephalus* spawns in autumn with its peak in November. Variations in *K* and HSI were clearly associated with reproduction activity. Sperm quality parameters varied significantly during the spawning season. Sperm volume decreased significantly from 0.41 ± 0.33 mL on November 7 to 0.26 ± 0.22 mL on December 2, while spermatozoa concentration increased significantly from $0.35 \pm 1 \times 10^9$ mL⁻¹ to $26.48 \pm 42.5 \times 10^9$ mL⁻¹. The highest VCL (27.26 ± 1.05 μ m s⁻¹), VSL (13.40 ± 1.03 μ m s⁻¹), VAP (17.91 ± 1.08 μ m s⁻¹) and LIN ($36.64 \pm 1.69\%$) values were observed in November. The current finding provided valuable information on *M. cephalus* reproduction in Algerian coastal environment, particularly by revealing optimal periods for further artificial reproduction, especially concerning sperm cryopreservation.

Keywords: *Mugil cephalus*, wild flathead grey mullet, spawning season, biometric indices, sperm parameters, sperm cryopreservation, artificial reproduction

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INTRODUCTION

The flathead grey mullet *Mugil cephalus* Linnaeus, 1758 (Teleostei: Mugilidae) is a cosmopolitan euryhaline species distributed worldwide in coastal waters: lagoons, bays, and estuaries between latitudes 42°N and 42°S. It is one of the important species for both commercial fisheries and aquaculture in several Mediterranean and East Atlantic countries, with production being about 100 000 tons a year⁻¹ [49]. Unfortunately, in recent years, *M. cephalus* has become endangered and rare, primarily due to high fishing pressure and increasing pollution [9].

Nowadays, much information is available concerning *M. cephalus* reproduction, both in captive and wild conditions, however, most of these studies have been focused more on female than on male populations. In wild conditions, Gonadosomatic Index (GSI) [9, 45],

oocyte histological features [6, 21] and gonads developing dynamics [5] have been investigated.

Sperm quality in fish seems to be potentially a very effective and accurate indicator of the different events occurring during the spawning season [34, 36]. Indeed, in species that have annual reproductive cycles, it is reported clearly that seasonality significantly impacts sperm parameters [4, 7, 34]. Particularly, sperm morphology, concentration, volume, motility and seminal osmolality fluctuate significantly during the spawning season [1, 2, 4, 7, 12, 34, 36]. This could be related to the environmental conditions such as temperature and photoperiod, which consequently impact hormonal regulation of spermiogenesis [15].

Nevertheless, comprehensive information on sperm characteristics in *M. cephalus* is fairly limited, especially in wild condition. In fact, studies have been focused exclusively on the effects of cryogenic preservation [8], spermiogenesis using exogenous hormones

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