



Scientific note

Evidence of short-term discard mortality of trawled *Sphoeroides pachygaster* (Osteichthyes, Tetraodontidae) off the southern coast of Sicily (Central Mediterranean Sea)

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Abstract. Short term post-capture mortality was studied in *Sphoeroides pachygaster* trawled off the southern coast of Sicily. Fifteen specimens were monitored showing full inflation on the deck, poor swimming performance, and finally (100%) death. Discard mortality might explain the low standing stock.

Key words: blunthead blaasop pufferfish, stress, unaccounted fishing mortality, Central Mediterranean Sea

Resumo. Foi estudada a mortalidade de curto prazo, ocorrida após a captura, na espécie *Sphoeroides pachygaster*, capturada por arrasto ao largo da costa Sul da Sicília. Foram observados 15 exemplares, que quando chegaram ao convés se apresentavam inflados, com capacidade natatória deficiente, reações lentas, acabando por morrer. A alta taxa de mortalidade pós-rejeição pode explicar os baixos níveis de biomassa observados.

Palavras chave: baiacu, estresse, mortalidade por pesca não-explicada, Mar Mediterrâneo Central

Blunthead blaasop *sphoeroides pachygaster* (Müller & Troschel, 1848) is one of the best known alien species in the Mediterranean Sea (Golani *et al.* 2010). There is a general agreement that this puffer entered the Mediterranean through the Gibraltar Strait, although the possibility of a lessepsian migration cannot be excluded given the circumglobal distribution of the species (Relini & Orsi Relini 1995, Psomadakis *et al.* 2009). Evidence of impressive spreading throughout the whole Mediterranean has accumulated (Psomadakis *et al.* 2006, Zenetos *et al.* 2007, Hemida *et al.* 2009, Chérif *et al.* 2010, Golani *et al.* 2010) since its occurrence was first scientifically documented in 1979 (Oliver 1981). Such as fast diffusion might be also related to the lack of physical barriers once an alien species has become established (Golani 1998). Since the beginning of 1990, the grounds off the

southern coast of Sicily and the Maltese Islands have hosted a well established population of *S. pachygaster* (Ragonese *et al.* 1992, 1997, 2001, Sciberras & Schembri 2007), but the population density off the southern Sicily (GFCM – GSA, geographical sub area, n 16) presently is at a low level according to the experimental surveys and fishermen, respectively. The experimental frequency of occurrence (i.e., positive hauls, f%), density (DI, N/km²) and biomass (kg/km²) indexes for 2008 (shelf area, 10-200 m) were calculated to be quite low in both the spring (MEDITS; f= 5%; DI = 1.6; BI = 1.8) and the autumn (GRUND; f= 3%; DI = 0.7; BI = 1.1) surveys (see Relini 2000 and Bertrand *et al.* 2002, for GRUND and MEDITS program specifications, respectively). Although no proof of poisonous flesh has been reported for the Mediterranean specimens (Ozturk 2010) of

S. pachygaster, all captures are discarded at sea (Golani *et al.* 2010). Consequently, two main causes might explain the low standing stock off the southern Sicilian coast: a) the currently unknown conditions (Golani *et al.* 2010), which were favorable to the initial invasion, have negatively (for the species) changed, and/or b) the stock, although established, has suffered some induced fishing mortality. Plausible negative changes for the species could be a reduction in the sea water temperature (Quéro *et al.* 1998, Chérif *et al.* 2010), a modification of the Atlantic surface current pattern (Psomadakis *et al.* 2006) or competition with both native or alien species recently introduced in the area (Goren & Galil 2005).

Preliminary trials were conducted between 2001 and 2008, during the experimental bottom trawl monitoring surveys routinely carried out by IAMC CNR in the Strait of Sicily. Once on the deck, the specimens were treated according to the established “commercial” procedures, with the only difference being their placement in a large, aerated, holding tank on board, continuously supplied with seawater. Hence, the specimens were regularly monitored for annotation of inflation degree, body position and swimming performance.

Fifteen specimens (body weight range: 100 to 2500 g), caught in 30-minute daytime hauls between 65 and 196 m depth, were monitored. All specimens exhibited similar behaviours: a) full inflation when landed on the deck (Fig. 1), mainly as a consequence of the rapid haul-back of the net through the water column (see Psomadakis *et al.* 2006); b) slow deflation (almost never completed); c) anomalous position (on a side or up-side-down), d) poor swimming ability (even when partially deflated), e) low mobility (Fig. 2), f) death. Once unloaded on-deck, 40% of the specimens died

within the 1st hour and 87% died by the 6th hour. The highest survival time was exhibited by two adults specimens: a male (2.2 kg) and a female (1.2 kg), which died after 9 and 15 hours, respectively. Assessing unaccounted mortality in trawl-caught and discarded fish is a complex task given the difficulties of implementing a proper procedure, the cumulative interaction between multiple stress factors (e.g., tow duration, codend catch entity and typology, sea conditions, on-deck handling and air exposure, seawater and air temperature, light intensity) and the biological attributes of the species (Wassenberg & Hill 1993, Chopin & Arimoto 1995, Davis 2002, Suuronen 2005, Broadhurst *et al.* 2006). In particular for the latter aspect, induced fishing mortality is expected in pufferfish, given their tendency to body inflation by swallowing water or air, which results in a mortality-prone phenomenon when they are returned to the sea (Davis 2002, Broadhurst *et al.* 2006). Notwithstanding the fishermen from Mazara reported caught puffer were able to remain alive for a variable time on the deck (Ragonese *et al.* 1997) and the lack of comparable specific data, present experimental results suggest that trawled Blunthead blaasop pufferfish are significantly impacted as a result of the capture and discard stressors. Considering that Sicilian fishermen operate commercial hauls 2-4 times longer than the experimental tows, it is most likely that pufferfish suffer a 100% discard mortality. Finally, given the universally high fishing pressure exerted on the Mediterranean demersal stocks (Papaconstantinou & Farrugio 2000) and the subsequent decline in landings (FAO 2010), present results indicate that the collateral effect of fishing should be taken into consideration when monitoring the population status of alien species stocks, even when not landed.



Figure 1. Inflated *Spherooides pachygaster* on the deck, just after the capture (Scale bar = 20 cm).



Figure 2. Inflated, up down positioned and poor swimming *Spherooides pachygaster* in the tank (Scale bar = 5 cm).

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