POPULATION PARAMETERS OF *MELICERTUS KERATHURUS* (DECAPODA, PENAEIDAE) IN SOUTHWEST SICILIAN SHALLOW WATERS (MEDITERRANEAN SEA) USING LENGTH-FREQUENCY ANALYSIS

BY

S. VITALE¹,⁴, L. CANNIZZARO², L. LUMARE³ and S. MAZZOLA²

¹,²) Consiglio Nazionale delle Ricerche, Istituto per l’Ambiente Marino Costiero, detached units of:

¹) Mazara del Vallo; via Luigi Vaccara, 61, I-91026 Mazara del Vallo, Italy

²) Capo Granitola, via del Faro, 3, I-91021 Campobello di Mazara, Italy

³) Unità di Ricerca di Gambericoltura, Dipartimento di Scienze e Tecnologie Biologiche ed Ambientali, Università del Salento, Via prov. Lecce – Monteroni, I-73100 Lecce, Italy

ABSTRACT

The growth and mortality of the Caramote shrimp, *Melicertus kerathurus* (Forskål, 1775), in the shallow waters off southwest Sicily (central Mediterranean Sea) were estimated based on length-frequency data using the FISAT II software. The carapace length (*CL*) of the 1504 sampled shrimps ranged from 16.2 to 63.3 mm. Based on the *CL* frequency distribution, the shrimp population off the south-western Sicilian coast is composed of two dominant modes, representing shrimps of one and two years old, respectively, plus a few specimens up to three years old. The overall population growth parameters obtained from the seasonalized Von Bertalanffy growth function were: *CL*ₜₐ₇ = 72.00 mm, *k* = 0.78 yr⁻¹, *C* = 0.29, and *WP* = 0.55. Total mortality, *Z*, based on the mean *CL* of shrimp in the catch, was 1.49 yr⁻¹ using the Beverton & Holt equation and 1.28 yr⁻¹ using the Ault & Ehrhardt equation. The instantaneous natural mortality *M* was 0.94 yr⁻¹ and the exploitation ratio *E* was estimated between 26% and 37%. Based on the present data, it can be concluded that off the south-western coast of Sicily the Caramote prawn stock is currently experiencing an underfishing condition.

RIASSUNTO

La crescita e la mortalità della Mazzancolla *Melicertus kerathurus* (Forskål, 1775), sono state stimate dalla distribuzione della frequenza di taglia con l’ausilio del programma FISAT II. La lunghezza del carapace (*CL*) dei 1504 gamberi oscillava tra 16,2 e 63,3 mm. Nella costa sud-occidentale della Sicilia, la distribuzione della frequenza di taglia della popolazione di gamberi è composta da due mode dominanti che rappresentano gamberi di uno e due anni oltre a pochi esemplari di tre anni. I parametri di crescita di tutta la popolazione, ottenuti dalla funzione di crescita...
stagionalizzata di von Bertalanffy, furono: \( CL_\infty = 72,00 \text{ mm}, \ k = 0,78 \text{ anno}^{-1}, \ C = 0,29 \) and \( WP = 0,55 \). La mortalità totale \( Z \), stimata sul valore medio della \( CL \) del gambero nella cattura, è stata pari a 1,49anno\(^{-1}\) usando l’equazione di Beverton & Holt e 1,28anno\(^{-1}\) usando l’equazione di Ault & Ehrhardt. La mortalità naturale \( M \) è stata pari a 0,94anno\(^{-1}\) e il tasso di sfruttamento \( E \) è stato stimato tra il 26% e il 37%. I risultati ottenuti permettono di concludere che nella costa sud-occidentale della Sicilia lo stock della Mazzancolla è in condizioni di sotto-sfruttamento.

**INTRODUCTION**

The Caramote prawn, *Melicertus kerathurus* (Forskål, 1775), is widely distributed in the shallow waters of the Mediterranean Sea. Its geographical distribution covers the whole Mediterranean as well as the Atlantic coast from north of Angola to Portugal. It lives in coastal marine or brackish waters on muddy-sand or sand. This shrimp is usually recorded at a depth of 0.5 to 90 m but is commonly found between 5 and 50 m (d’Udekem d’Acoz, 1999). Unusually, in the Strait of Sicily, catches of Caramote prawns have been reported from depths between 100 and 640 m (Ragonese & Giusto, 1998).

The Caramote prawn is highly prized on most markets throughout the Mediterranean and like all open-access fisheries tends to suffer from excess fishing pressure. In the central Mediterranean Sea, this shrimp is an important fishery target for Tunisian, Greek, and Libyan fishermen (Ben Mariem, 1995; F.A.O., 2000; Conides et al., 2006; Kevrekidis & Thessalou-Legaki, 2006), whereas it is considered rarer along the southern coast of Sicily (Pipitone & Tumbiolo, 1993). Its presence was confirmed, however, by a catch-effort survey carried out along the whole Sicilian coast in the biennium 1998, 1999. A similar study was also conducted along the coast of the Thracian Sea, and showed that the mouths of the rivers Nestos and Evros were important fishing grounds of Caramote prawns (Cannizzaro et al., 2000, 2001). The high fishery pressure on this shrimp was studied in Greek waters in the Amvrakikos Gulf (Ionian Sea) where the stock is exploited only by the local artisanal fleet, and in the Thermaikos Gulf (northern Aegean Sea), where the stock is exploited not only by the artisanal fleet but by otter trawlers as well. Both areas were found to have suffered a severe decline in the shrimp population (Klaoudatos et al., 1992; Conides et al., 2006; Kevrekidis & Thessalou-Legaki, 2006).

Moreover, Caramote prawn populations are under pressure because of the invasion and establishment of penaeid species from the Red Sea through the Suez Canal (Galil, 2000; Galil & Kevrekidis, 2002), as well as by human-induced habitat changes in the Mediterranean (Wadie & Abdel Razek, 1985). Reviews are available on the population structure of this shrimp in the Mediterranean: Ben Mariem (1993, 1995, 2004) in the Tunisian Gulf of Gabès, Conides et al. (2006) in the