SIZE SELECTIVITY OF SQUARE MESH BARRIERS FOR *CALLINECTES SAPIDUS* RATHBUN, 1896 (BRACHYURA, PORTUNIDAE)

BY

GÖKHAN GÖKÇE[1,4]), MUSTAFA ÇEKİÇ[2]), CENGİZ METİN[3]) and HÜSEYİN ÖZBİLGİN[3])

[1]) Faculty of Fisheries, Çukurova University, TR-01330 Balcalı, Adana, Turkey

[2]) Yumurtalık MYO, Çukurova University, Yumurtalık, Adana, Turkey

[3]) Faculty of Fisheries, Ege University, TR-35100 Bornova-Izmir, Turkey

ABSTRACT

This study investigates the effects of square mesh barriers of various mesh size on escape success of the blue crab, *Callinectes sapidus*, under laboratory conditions. A total of 743 crabs was caught by beach seine and held in a shore-based aquarium, in circular tanks (∅ 4 m × 0.9 m) with 0.3 m water depth. Using barriers constructed with square mesh of known size (35, 40, and 45 mm bar length), the proportion of crabs escaping through each mesh size was measured for each half centimetre carapace width (CW) class. A logistic model was fitted to the size frequency data of the retained and escaped blue crabs for each mesh size in the experiment. L_{50} for the 35, 40, and 45 mm (bar length) square meshes tested in this study was 8.09 (s.e. 0.117), 9.32 (s.e. 0.088), and 10.56 (s.e. 0.114), respectively. This paper provides the first results for blue crab square mesh selectivity, which could be used as a reference point to indicate the most appropriate mesh sizes to be tested in crab traps during more comprehensive sea trials.

RÉSUMÉ

Cette étude porte sur l'effet barrière de différentes tailles de maille de filets sur le succès de l'échappement du crabe bleu, *Callinectes sapidus*, en conditions de laboratoire. Un total de 743 crabes a été capturé à l'aide d'une seine de plage et maintenus dans un aquarium sur la plage, dans des réservoirs circulaires (∅ 4 m × 0,9 m) de 0,30 m de profondeur d'eau. En utilisant des barrières construites avec des filets de vides de mailles connues (35, 40, et 45 mm), le pourcentage de crabes s'échappant à travers chaque taille de maille a été mesuré pour chaque classe de largeur de carapace (CW) variant de 0,5 cm. Un modèle mathématique a été ajusté aux données de fréquence de taille des crabes échappés et non échappés pour chaque vide de maille de l'expérimentation. La L_{50} pour les mailles de 35, 40 et 45 mm testées au cours de cette étude était 8,09 (e.s. 0,117), 9,32 (e.s. 0,088), et 10,56 (e.s. 0,114) respectivement. Cette étude fournit les premiers résultats quant à la sélectivité des crabes par rapport à la taille de la maille; ils pourraient être utilisés comme référence pour indiquer les tailles de mailles les plus appropriées pour être testées dans les pièges à crabes au cours d'essais plus poussés en mer.

[4]) Author for correspondence; e-mail: gokceg@cu.edu.tr

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INTRODUCTION

The blue crab, *Callinectes sapidus* Rathbun, 1896, is an important commercial species that inhabits coastal areas, estuaries, and lagoons throughout the southern part of Turkey (Enzenross et al., 1997; Türeli, 1999). The maximum carapace width (CW) of the blue crab reported in Turkey is 18.1 cm, and mean CW is 12 cm for both female and male crabs (Türeli, 1999; Atar & Seçer, 2003). Reported size at first maturity is 6.05 cm for female and 4.48 cm for male individuals (Türeli, 1999). Hexagonal or square mesh wire traps with a small mesh size are currently used by commercial fishermen to catch blue crabs in Turkish lagoons. In Turkish fishery regulations, there is a Minimum Landing Size (MLS) of 8 cm CW with a 5% tolerance of smaller individuals for the blue crab (Anon., 2004). However, there is no required mesh shape, nor a minimum mesh size limit for traps, which constitute the most commonly used fishing gear in crab fisheries. Mesh size selection is crucial, because it determines the size composition of the catch, and, consequently, the sub-legal to legal ratio (Guillory & Prejean, 1997). Unacceptable numbers of sub-legal blue crabs and immature fish, which are commonly abundant in lagoons, will be retained if the mesh size is too small; conversely, the catch of legal blue crabs will be reduced if the mesh is too large.

In fisheries management, size selectivity curves are important for estimates of incidental mortality, recruitment in yield-per-recruit analysis, and age- and length-based population models (Millar & Fryer, 1999). Notably, size selectivity can be used to evaluate the MLS and the effects of changing escape vent or mesh size regulations on the future productivity of this resource (Treble et al., 1998).

This study investigates the effects of three square mesh barriers (35, 40, and 45 mm bar length) on the escape success of blue crabs under laboratory conditions.

MATERIAL AND METHODS

Experiments were carried out at the Aquaculture Unit of the Faculty of Fisheries, Çukurova University, Adana, Turkey, in August 2005.

Blue crabs were caught by using a beach seine in Çamlık lagoon near Adana. Experimental animals were handled carefully to minimize injuries and deaths, and were immediately transported to the aquaculture unit and kept in a tank with flowing sea water. A total of 743 crabs was used in the experiment. CW and carapace length (CL) of crabs were measured using a digitized calliper rule (Mitutoyo Absolute Digimatic Caliper, Series 500). Before the experiments began, each crab was labelled with an identity number written on the carapace with non-permanent white-coloured pen.