World Journal of Fish and Marine Sciences 4 (5): 458-461, 2012
ISSN 2078-4589

DOI: 10.5829/idosi.wjfms.2012.04.05.6415

The Effects of Jig Color and Depth Variationon Catch Rates of Purpleback Flying Squid, *Sthenoteuthisoualaniensis* (Lesson, 1830) in Iranian Waters of the Oman Sea

[1]Seyed Yousef Paighambari, [1]Moslem Daliri and [2]Mohamad Memarzadeh

[1]Department of Fisheries, Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, Iran
[2]Iranian Fisheries Organization, Tehran, Iran

Abstract: The objective of the present study was to determine the effects of jig color and depth variations on squid catchability in Iranian waters of the Oman Sea (Bandar-e jask and Chabahar). Two different colors of jigs (green and blue) were used together in same angle. A total of 2270 (1119 Kg) squid were captured by automatic machine during the study. Purpleback Flying squid (*S. oualaniensis*) with 96.5% of the total catch was the dominated species and Indian squid (*L.davauseli*) was found rarely.The number of 1247 (weight: 603.3 Kg) of this value was belong to green type of jig and 1023 (weight: 515.7 Kg) were caught by blue type of jig. Catch rates was calculated 5.188 Kg h^{-1} and 3.8 Kg h^{-1} for green and blue jigs respectively. According to t-test results, there wasn't significant difference between catch rates of squid with green and blue jigs ($P>0.05$). Kolmogorov-Smirnov test proved that the size composition of dorsal mantle of caught squids didn't differ significantly between different jig colors ($P>0.05$). Results of one-way analysis of variance (ANOVA) test showed that the catch rate of squid was higher in shallower waters ($P<0.05$).

Key words: Squid Fishery % Jig Color % Catch Rate % Purpleback Flying Squid % Oman Sea

INTRODUCTION

The earth's growing population has caused an increased demand for food, and aquatic resources can provide prime source of high-quality protein. Cephalopods are one of the most important sources of seafoods. Squid is a valuable cephalopod both human nourishment and utilization in fisheries such as live bait for angling and feed of some aquaculture species [1]. Total cephalopods (squid, cuttlefish and octopus) production was computed as 2.18 million tonnes in the world in 2002 [2]. This is 2.3% of the whole fishery production of the world. Spain, France, China and South East Asia countries had the highest Squid fishing value in the worldwide [3]. Squid catching is conducting by different fishing gears such as jigging (as targeted) and trawl, purse seine and gill nets (as bycatch) in the worldwide.

The waters of the Persian Gulf and Oman Sea are environmentally unique that many species of cephalopods and squid live in this region [4,5]. Since there is no literature about squid jigging in Iranian waters of the Oman Sea, The purpose of this study is to determine the effects of jig color and depth variation on squid jigging.

MATERIALS AND METHODS

The study area covered the fishing grounds of Bandar-e Jask and Bandar-e Chabahar in the Oman Sea (longitude of 57° to 61° E and latitude of 24° to 26° N) (Fig. 1). The specimens were caught by C/V KAVEH, which has 62 m length and 2364 horse power engine. Two jig colours (green and blue) and monofilament lines (as main line) were used in the fishing operations. A swivel was also used to avoid the twisting. All jigs were the same sized 7 cm and shrimp shaped (Fig. 2). 350g sinkers were used at the end of monofilament lines. The cruises were carried out in the nighttime and squid sattracted by powerful lights on the vessel. The number of 136 lamps (1500 W) was suspended on cables above the deck of the vessel. Dorsal mantle length (DML) of individuals was measured to the nearest 0.1 cm. In addition, body weight was taken on a digital balance

Corresponding Author: Seyed Yousef Paighambari, Department of Fisheries, Gorgan University of Agricultural Sciences and Natural Resources, Iran.

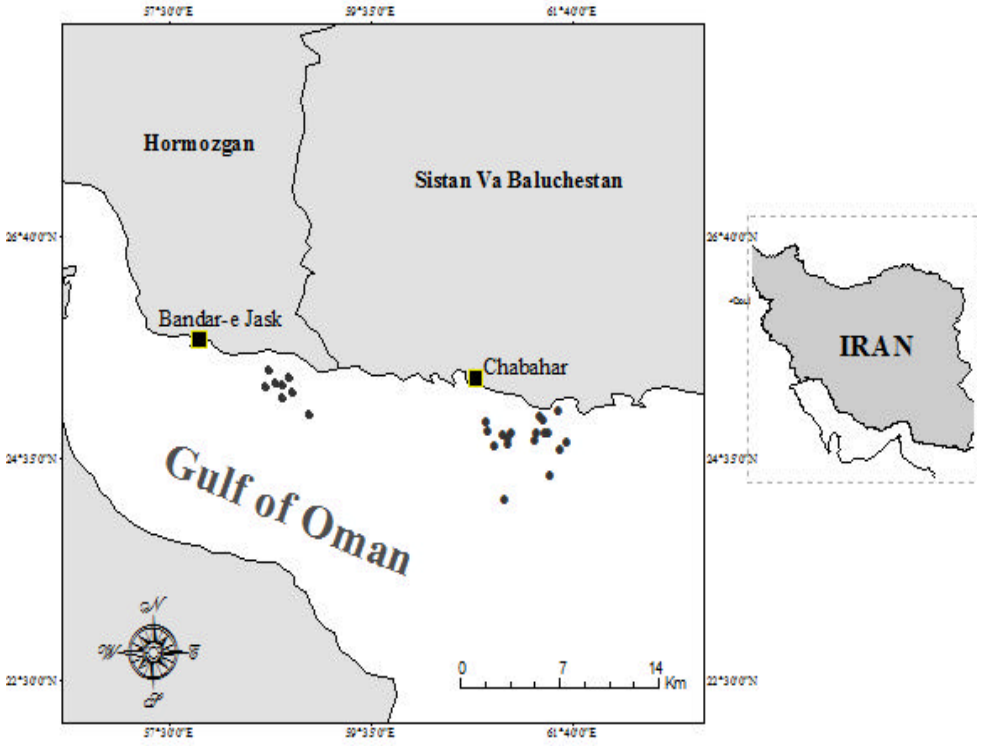

Fig. 1: Map of the study area (Oman Sea - Bandar-e Jask and Chabahar).

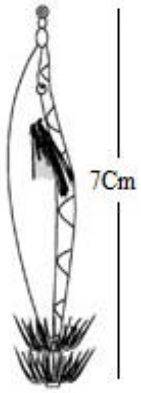

Fig. 2: Shape of Squid jig used at the present study.

with 0.01 g accuracy. Fishing grounds depths were measured by echo sounder and ranged from 72 to <2500m. Data analyses were done by SPSS19 software. Kolmogrov-Smirnow and Levene tests were used to analyze normality of the data and homogeneity of variances [6]. A two independent samples t-testand ANOVA test were used for comparison of catch rate between different jig colours and three depth strata (<500m, 500-1500m and >1500m). Duncan's test was used for a posteriori comparison among means of different depths. A Kolmogorov-Smirnov test was also used to determine whether the size composition of dorsal mantle ofindividual's significantly differed between different jig colours. Statistical analyses were considered significant at "=5% level.

RESULT

At this study, purpleback flying squid (*Sthenoteuthi soualaniensis*) was the dominated species with 96.5% of the total catch. However, Indian squid (*Loligo davauseli*) was found rarely. 2270 squids with total weight of 1119 Kg were caught. The number of 1247 (weight: 603.3 Kg) of this value was belong to green type of jig and 1023 (weight: 515.7 Kg) were caught by blue jigs. Catch rate was computed 4.495Kg hG^{1} generally. Catch rates was also calculated 5.188 Kg hG^{1} and 3.8 Kg hG^{1} for green and blue types of jig respectively (Fig. 3). Results of t-test showed no significant differences between catch rates of squid with green and blue jigs (P>0.05). The size composition of dorsal mantle of caught squids did not differ significantly between different jig colours (D_{Ks}=14.082, P=0.07; Fig. 4). The catch rate of squid was also affected by depth variation and it was higher in shallower waters (P<0.05; Fig. 5).

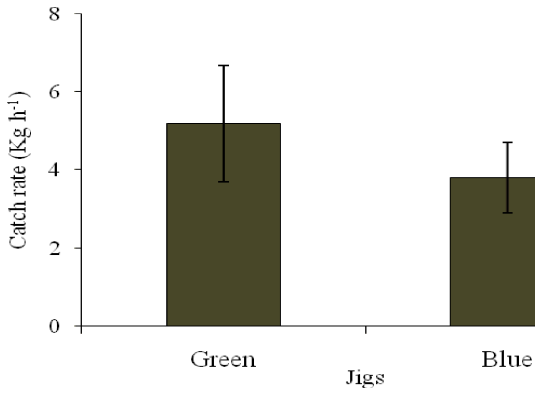

Fig. 3: Mean catch rates±SD (kg hG^{1}) of squid with different jig colours.

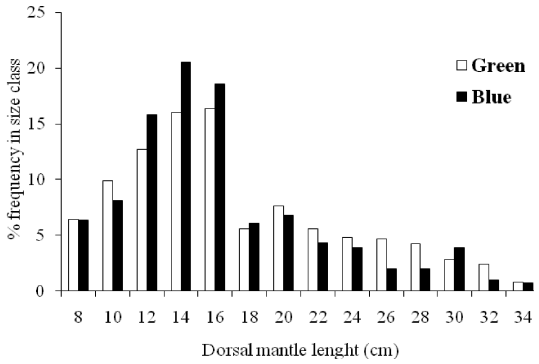

Fig. 4: Length frequency distribution of caught squids during the present study.

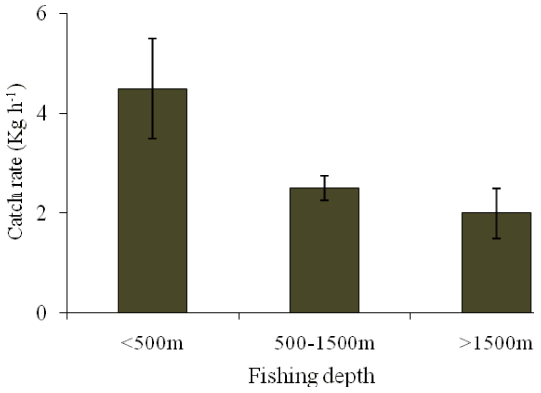

Fig. 5: Mean catch rate ± SD (kg hG^{1}) of squid in different depths (*: indicate the significant difference).

DISCUSSION

The fishing variations, such as changes in abundance and size or age structure, are one of the principal aims of study in exploited cephalopod stocks [7].

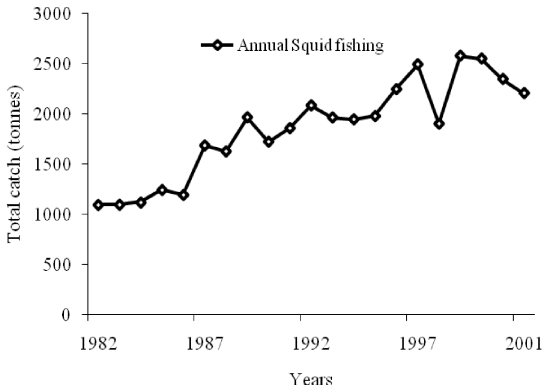

Fig. 6: Annual catches of all squids in the worldwide (1982-2002)

According to our results efficiency of green and blue jigs had no significant difference, this is in agreement with reports of Mercer and Bucy [8] and Ulas and Aydin [9]. While Altinagac [1] reported that the green jigs were more efficient than red jigs in his day time samplings. Time of sampling and low visibility of water could be the reasons to this difference. In the presentstudy, the difference of jig colourson dorsal mantle length (DML) of caught squids was not statistically significant, which this is in agreement with report of Ulas and Aydin [9]. The difference between the catch rates (Kg hG^{1}) of squid in shallow and deeper waters indicates the bathymetrical distribution of squid in the study area.Young and Hirota [10] recorded the lowest catch rate of *S. oualaniensis* in dipper waters of the Hawaiian Archipelgo. They reported also that squid normally occupy depths of about 650m or more during daytime. Nesis [11] also cited the absence of *S. Oualaniensis* from continental shelves and deeper waters.

Fisheries for squid have attracted interest worldwide over the last two decades. This is interesting, both because of the commercial potential of squid fisheries and the role that they might have in the provision of high quality protein for human consumption [12] (Fig. 6). Developing of squid jigging in Iranian waters of the Oman Sea is affordable for small-scale fishermen due to (i) high socio-economic price, (ii) low bycatch value and (iii) low cost of fishing gears.

Declining catches in many traditional fisheries have led to increased effort to develop the potential of non-traditional species such as the cephalopods and squid. This was the first study on squid jiggingin Iranian waters of the Oman Sea and it can provide basic information for squid fishery in the region.

ACKNOWLEDGEMENTS

The authors thank the Captain and Crew of C/V KAVEH for their cooperation.

REFERENCES

1. Altinagac, U., 2006. Effects of jigs colour to catching efficiency in the squid fishing in Turkey. Pak. J. Biol. Sci., 9(15): 2916-1918.
2. FAO, 2002. Year books of Fishery Statistics Summary tables 2002. ftp://ftp. fao. org/fi/stat/ summary/ default.htm.
3. Papan, F., A. Jazayeri, H. Motamedi and S. Mahmoudiasl, 2011. Study of the nutritional value of Persian Gulf squid (*Sepia arabica*). J. Amer. Sci., 7(1): 154-157.
4. Reynolds, R.M., 1993. Physical oceanography of the Gulf, Strait of Hormuz and the Oman Sea: results from the Mitchell Expedition. Mar. Poll. Bul., 27: 35-60.
5. Carpenter,K.E., F. Krupp, D.A. Jones and U. Zajonz, 1997. Living marine resources of Kuwait, Eastern Saudi Arabia, Bahrain, Qatar and the United Arab Emirates. Food and Agriculture Organization of the United Nations, pp: 3-32.
6. Zar, J.H., 1999. Biostatistical Analysis.4th edition. Prentice-Hall, Englewood Cliffs, New Jersey, pp: 929.
7. Boyle, P.R. and P. Rodhouse, 2005. Cephalopods: Ecology and Fisheries. Blackwell Publishing, UK.
8. Mercer, R.W. and M. Bucy, 1983. Experimental squid jigging off the Washington Coast. Marine Fish. Rev., 45: 7-9.
9. Ulas, A. and I. Aydin, 2011. The effects of jig colour and lunar bright on coastal squid jigging. Afr. J. Biotech., 10(9): 1721-1726.
10. Young, R.E. and J. Hirota, 1998. Review of the ecology of *Sthenoteuthisoualaniensis* near the Hawaiian Archipelago. In: Okutani T (ed.) Contributed papers to international symposium on large pelagic squids. Japan Marine Fishery Resources Research Centre, Tokyo, pp: 131-143.
11. Nesis, K.N., 1993. Cephalopods of seamounts and submarine ridges, In: Okutani, T. R. K. O'Dor & T. Kubodera (eds). Recent advances in cephalopod fisheries b iology. Tokai Univ. Press, Tokyo, pp: 365-373.
12. Caddy, J.F., 1990. Options for the regulation of Mediterranean demersal fisheries. Nat. Res. Model., 4: 427-475.