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

Seyed Yousef Paighambari, Moslem Daliri and Mohamad Memarzadeh

1Department of Fisheries, Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, Iran
2Iranian 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 attracted 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.
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.

At this study, purpleback flying squid (*Sthenoteuthis 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 which was caught by green jigs. 1023 squids (weight: 515.7 Kg) were caught by blue jigs. Catch rate was computed 4.495 Kg h\(^{-1}\) and 3.8 Kg h\(^{-1}\) 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. Statistical analyses were considered significant at "*=5% level.

RESULT

At this study, purpleback flying squid (*Sthenoteuthis 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 which was caught by green jigs. 1023 squids (weight: 515.7 Kg) were caught by blue jigs. Catch rate was computed 4.495 Kg h\(^{-1}\) and 3.8 Kg h\(^{-1}\) 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. Statistical analyses were considered significant at "*=5% level.

Statistical analyses were done by SPSS19 software. Kolmogorov-Smirnov and Levene tests were used to determine whether the size composition of dorsal mantle of individual’s significantly differed between different jig colours. Statistical analyses were considered significant at "*=5% level.

ANOVA test were used for comparison of catch rate differences 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 compare the size composition of dorsal mantle of individual’s between different jig colours. Statistical analyses were considered significant at "*=5% level.
**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].

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 present study, the difference of jig colour on 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 h\textsuperscript{G}) of squid in shallow and deeper waters indicates the bathymetrical distribution of squid in 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 jigging in Iranian waters of the Oman Sea and it can provide basic information for squid fishery in the region.
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REFERENCES