Diamondback Squid (*Tysanoteuthis rhombus*) Exploration in the South China Sea, Area III: Western Philippines

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ABSTRACT

The diamondback squid (*Tysanoteuthis rhombus*) is a potential resource popularized mainly for the export market in the Central Philippines and the positive results from other experimental activities. Exploratory fishing for the species using the giant squid jig was conducted on board MV SEAFDEC and MV Maya-Maya in the South China Sea (Western Philippines) to determine its occurrence, abundance and distribution in these areas.

The gear employed is basically used in small boats hence, its operation on bigger vessels was very difficult. The result was discouraging with only one diamondback squid caught out of the 175 jigs set. The description and fishing operations of the gear are presented with comparison from other research and fishing results conducted in Camotes Sea, Calauag Bay, and Ormoc Bay which are considered potential areas.

Keywords: *Tysanoteuthis rhombus*, diamond-back squid, South China Sea, Exploratory survey.

Introduction

There are four (4) genera and seven (7) species of the squid species in the country with the *Loligo edulis, Loligo duvaucelli and Sepioteuthis lessoniana* considered the most common. Informations on effort, catch and biology of these species are cursory and often unavailable. Voss (1963) wrote the first extensive report on the taxonomy of Philippine cephalopods. Flores (1974) surveyed the traditional fishing grounds and identified some fishing gears. Hernando and Flores (1981) also described the different squid fishing gears used in the country and contributed information in terms of species identification, fishing seasons, and production.

Squid is considered as one of the few resources capable of increasing production (Chikuni, 1983). It is also suggested that other methods of squid fishing is not well developed. Dickson (1991) described the traditional giant squid jig gear and its construction being operated by fishermen in Camotes Sea in Central Visayas. Jigging is done during daytime from early morning to afternoon at depths from 364m to 455 m. Except for bad weather, fishing can be done the whole year round with peak months from May to August. The country produced 54,458 mt. of squid from the municipal and commercial fisheries sectors of which 24.6% were exported (BFAR, 1996).

Among the squid species, the diamond back squid (*Tysanotheuthis rhombus*) is the most uncommon and is a latent resource. Usually caught in pairs, this squid is caught for the export

market in the Camotes Sea in the central Philippines. Fishing effort, production and other basic information are however, unavailable. With the exception of this existing fishery, this species and its harvest is virtually unknown in other parts of the country. Exploration of other fishing grounds was only given attention after the 1990 Most Outstanding Fishermen of the Year was awarded to a fisherman whose catch was mainly the diamondback squid. Records gathered from Escario (1990) from 1989 to 1990 showed that he was able to catch 384 pieces or 20 pcs, per month of the ***Tysanoteuthis rhombus*** in Camotes Sea.

Exploratory activities from 1991 to 1992 in a very limited area of Calauag Bay, Quezon Province yielded a total catch of 82 individuals (412 kgs) of this species or a mean catch-per-unit-effort (CPUE) of 4.84 individuals per 100 jigs or 0.018 kgs/jig/hour fishing. A total of 92 fishing days were completed using 1,650 jigs set. The occurrence of the species was obviously very seasonal from June to October with the highest CPUEs in August to September. The fishing area has an average depth of 145 m.

‘ Test fishing operation and monitoring of giant squid jig were conducted in Ormoc Bay, Leyte Province from March to December 1993 (Dickson, 1994). A total of 950 jigs were set at fishing depths of 182m, 209m and 237 m. The fishing operations yielded 159 kilograms (34 pieces) of *Tysanoteuthis rhombus*. The 237 m depth produced the highest number of catch (28 pieces). The weights ranged from 1.4 to 8.75 kg. each while the mantle length is from 362 to 669 mm. The catch per unit effort was 0.0051 kg/jig/hr or 3.41 pcs. per 100 jigs. Highest CPUEs was observed in August and September.

In Japan, the diamond back squid is caught by jigs and trapnet using 5 tonner boats. Known locally as “sode ika” its fishery only began in 1962 and became a new directed fishery with improvements on its commercial and fishing method. About 200 5-tonner boats are engaged in the operation and the average catch is 6-9 squid per boat during peak season. (Osako and Murata, 1983). The lack of information on its behaviour, migration and cause of quantitative variation are also recognized.

It is believed that diamondback squid is widely distributed and can be caught in the open seas. Exploratory fishing for the diamondback squid was undertaken during the recent SEAFDEC-BFAR Collaborative Research Survey on Fishery Resource and Marine Environment in the South China Sea: Western Philippines from April to May, 1998 to determine availability of the species in the area.

Materials and Methods

Fishing was carried out in sixteen (16) fishing stations (Fig. 1) using the giant squid jig. A unit of the gear is composed of a jig, monofilament line and a styropor bouy (Fig. 2). The line is fixed and coiled on the buoy and the jig is attached on the other end of the line. During setting, the jig is usually baited with milkfish. The weight of the baited jig automatically rolls the buoy and uncoils the line at a desired length. The gear is left to drift individually usually from early morning to mid-noon. Hauling requires manual coiling of the line into the buoy.

The operation of the gear was modified to suit for operation on board the 1,190 GT MV SEAFDEC and the 165 GT MV Maya-Maya.

MV SEAFDEC

Several setting techniques of the jigs were tried in Stations 1, 5, 7, 12, 14, 17, 21, 27, 30 and 31A. Using two (2) electric haulers located at the fore and aft port side of the vessel, the jigs

were set at five (5) different depths from a line fixed at the haulers. A mainline of the tuna longline was also tried to set the jigs in a horizontal/longline manner necessitating positioning at the port side where haulers are located on the windward side. Setting on one end of the tuna longline was also tried. To coordinate with other activities of the research cruise, the shooting of the giant squid jig were done only after the tuna longline have been set and hauling was done before the hauling of the tuna longline. Fishing was done between 5 am to 12 nn with immersion time varying from 1.5 to 6.7 hours depending on the operation of the tuna longline.

MV MAYA-MAYA

A mainline was provided to form a long line of jigs and was connected at one end of the tuna longline during operation. The jigs were set at five (5) different depths. The duration of fishing ranged from 5 to 7.7 hours. The jigs operation was conducted in Stations 8, 9, 16, 17, 23 and 25.

In all of the operations, milkfish was used as bait following the baiting position as described in Figure 2.

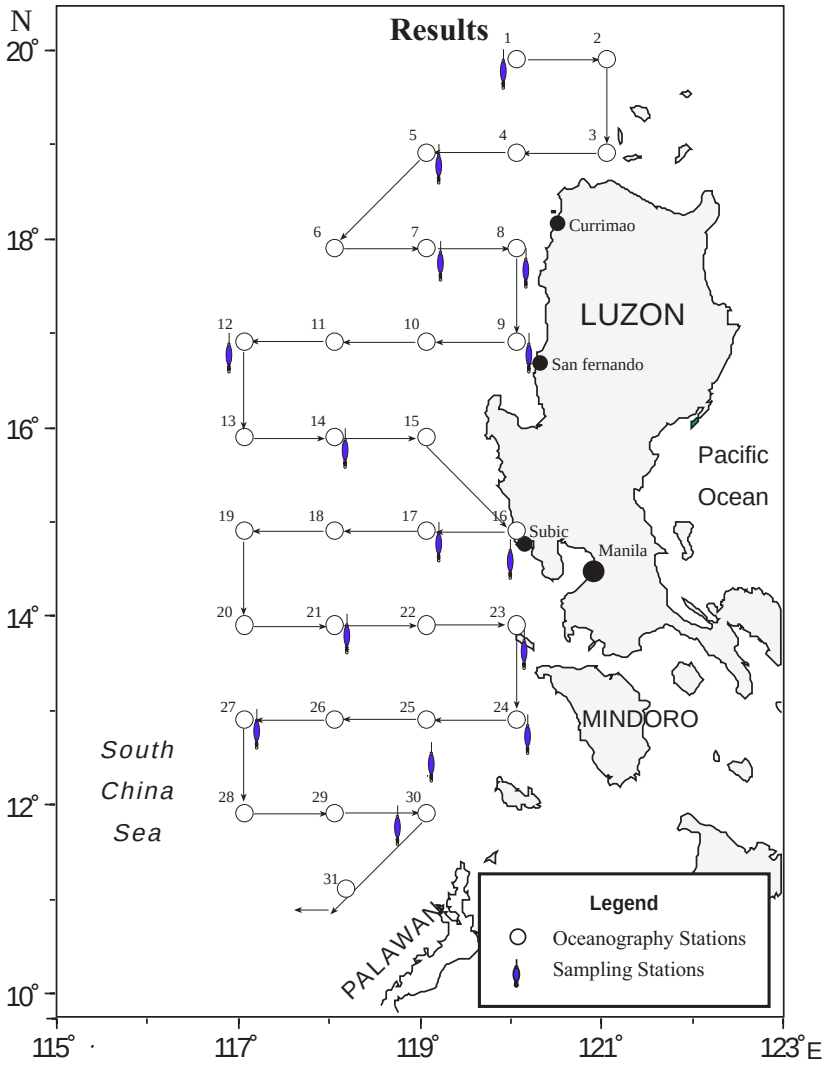

Fig. 1. Survey stations in the West Coast of Philippines

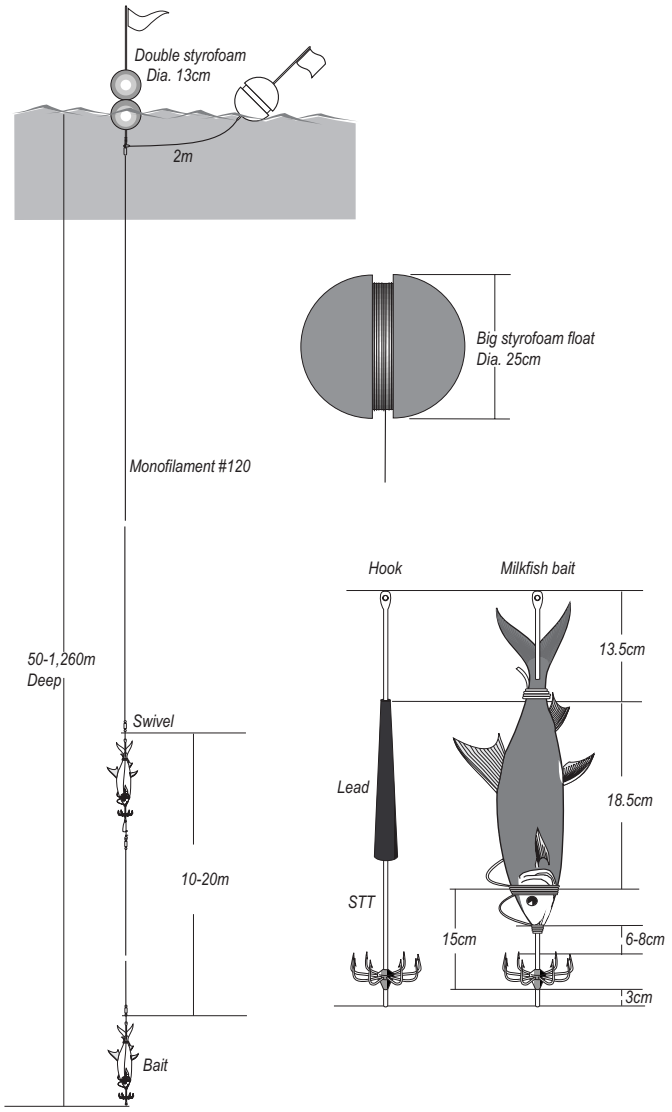

Fig. 2. Specification of the giant squid jig and its operation.

Results

The giant squid jig operations of both research vessels are summarized in Table 1. Fishing was tried using eight different lengths of line with emphasis on depths of 360m and 720 m. The deeper line was also recommended by Prof. Yoshihiko Nakamura, the Japanese consultant onboard MV SEAFDEC. Out of the 175 jigs set, 83 jigs or 47.4% were set at 360 m while 54 jigs or 30.8% were set at 720 m. The deepest set was at 1,260m.

The exploratory fishing indicated discouraging results with only one diamondback squid caught at a depth of 720m. The squid measures 54 cm mantle length and weighed 5.75 kgs. The other catch of MV MAYA-MAYA was 3 Pacific lancet fish. MV SEAFDEC operations yielded negative result. The temperature profile of the jigs stations is shown in Table 2. It appears that the range of the temperature was 30˚C to 6˚C from surface to a depth of 750 m.

The operation of the gear on board MV SEAFDEC was not easy with the single line attached to the haulers causing some troubles. Attempts to set the jigs in a longline position on the port side while the vessel was drifting and joining at one end of the tuna longline caused

Table 1: Giant Squid Jig Operations of M/V SEAFDEC and M/V Maya-Maya in South China Sea: Western Philippines,

Vessel	Stn.	Soaking Time (H)	Length of line (m)									Jig Hours	Catch
			150	180	360	540	720	900	1080	1260	Total		
SEAFDEC	*1*	*1.50*			*5*						*5*	*7.5*	*None*
	5	*2.27*			*6*						*6*	*13.6*	*None*
	7	*4.27*			*8*						*8*	*34.1*	*None*
	12	*4.55*	*1*		*2*	*2*	*2*	*2*			*9*	*41.0*	*None*
	14	*1.97*	*1*			*2*	*4*	*2*			*9*	*17.7*	*None*
	17	*1.97*	*2*			*2*	*4*	*2*			*10*	*19.7*	*None*
	21	*3.53*	*2*			*2*	*2*	*2*			*8*	*28.3*	*None*
	27	*5.10*	*2*		*2*	*2*	*2*	*2*			*10*	*51.0*	*None*
	31-A	*6.72*			*11*						*11*	*73.9*	*None*
	30-A	*4.67*			*9*						*9*	*42.0*	*None*
Subtotal		**36.53**	**8**	**0**	**43**	**10**	**14**	**10**	**0**	**0**	**85**	**328.7**	
MAYA-MAYA	*8*	*7.75*			*15*						*15*	*116.3*	*None*
	9	*6*			*15*						*15*	*90.0*	*2 lancetfish*
	16	*6.75*			*1*		*14*				*15*	*101.3*	*None*
	17	*6.92*		*1*	*5*		*2*		*3*	*4*	*15*	*103.8*	*1 lancetfish*
	23	*5.17*			*3*		*12*				*15*	*77.5*	*None*
	25	*6.67*		*2*	*1*		*12*				*15*	*100.0*	*1 gsquid (5.75 kg)*
Subtotal		*39.25*	*0*	*3*	*40*	*0*	*40*	*0*	*3*	*4*	*90*	*588.8*	
GRAND TOTAL		**75.78**	**8**	**3**	**83**	**10**	**54**	**10**	**3**	**4**	**175**	**917.5**	

entangled lines and trouble during operation. By using the skiff boat, the operation on MV Maya-Maya was easier joining the line at the end of the longline although manual coiling of very long lines was tedious.

Discussions

The effective capture of the diamondback squid is dependent on the determination of the appropriate jig line level, which corresponds, to an optimum condition where the species is likely to occur. It is usually distributed in the major currents like the Kuroshio and Tsushima Warm Current off Japan and good catches occurred in years when water temperature at 100m depth exceeds 17˚C and poor catches occurred during years when it was below 17˚C (Osako and Murata, 1983).

In the inland seas in the central Philippines, this species is caught by small bancas using similar jigs used in this survey at a depth of 150-300m deep. In a survey in Calauag Bay, a relatively shallow bay facing the Pacific Ocean, the squid was caught at about 70m-150m deep with temperatures ranging from 21˚C to 24˚C. The species was only caught in the months of June to October or just after summer. Good catches also coincided with the presence of lights being used by other gears in the bay (Dickson, *et. al*, 1993).

Table 2. Temperature profile on the Giant Squid Jig Stations.

Fishing Station	Temperature (oC)									
	Surface	100m	150m	200m	300m	450m	600m	750m	900m	1200m
1	28	23	17	16	12	8	7	6	4	3
5	28	18	15	13	11	9	7	6	5	3
7	28	18	15	13	11	8	7	6		
12	30	19	17	14	12	9	7	6	4	3
14	30	23	17	15	12	8	7	6	5	3
17	30	22	17	15	12	8	7	6	5	3
21	31	21	16	14	12	9	7	6	5	3
27	31	21	166	14	12	8	7	6	4	
30	31	19	16	14	11	8				
31	30	24	17	15	12	9				
No. of jigs set			8	3	83	10	54	10	3	4

Basing on ICTD data, the fishing depth temperature ranged from 4˚C to 24˚C. The temperature at 100m was about 18˚C to 24˚C. The only squid during this survey was caught using a 720 m line.

The previous surveys manifest its wide distribution over varying depths with migration and abundance largely due to changes in conditions like temperature, which may have caused the occurrence of the species in the deeper areas during this survey.

The stock size however appear to be scattered that fishing can only be practicable in nearshore areas and with the use of small boats. In addition, the operation of the squid jig was observed to be difficult in relatively large vessel like the MV SEAFDEC and MV MAYA-MAYA. This includes difficulties in maneuvering and in handling small but very long lines and may be only feasible in areas around the country with known squid concentration. The survey provided a very little information on the diamondback squid and further experiments should be recommended in other fishing areas to determine their occurrence and distribution as well as biological parameters in relation to oceanographic conditions.

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