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Catch Composition of a Set Bag Net used for *Acetes* Trapping in the Estuarine Waters of Kedah, Peninsular Malaysia

[1]A.A. Amani, [1,2]A. Arshad, [1]S.M.N. Amin and [3]N.A.A. Aziz

[1]Laboratory of Marine Science and Aquaculture, Institute of Bioscience, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia

[2]Department of Aquaculture, Faculty of Agriculture, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia

[3]Department of Biology, Faculty of Science, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia

Corresponding Author: A. Arshad, Department of Aquaculture, Faculty of Agriculture, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia

ABSTRACT

A study was conducted for a 12-month period, from June 2008 to May 2009 based on the catch data to determine the catch composition of Set Bag Net (SBN) that is a type of fishing net laid down to catch *Acetes* shrimps that move along the estuary of Merbok River in the state of Kedah, Peninsular Malaysia. Bag net is a static traditional gear with a cod end mesh size measuring 0.5 cm. The results showed that total catches of the bag net over a year period were constituted of three major catch groups viz. *Acetes* shrimps (89%), juvenile fishes (9%) and other non-*Acetes* shrimps (2%). The annual mean percentage composition of sergestid shrimps comprised of *A. japonicus, A. vulgaris and A. indicus* were found to be 89, 7 and 4%, respectively. The gear is very selective and besides *Acetes* there was also a small proportion of fish juvenile being caught. Seven species of juvenile fishes were recorded throughout the catch period however; their mean total abundance was very low (9%). Penaeid shrimp was the only group of non-*Acetes* shrimp been recorded. Based on the analyzed catch composition data, it could be concluded that SBN is *Acetes*-selective and not causing significant great damage to the juvenile fish population inhabiting the study area.

Key words: Catches, bag net, juvenile fish, Peninsular Malaysia

INTRODUCTION

The Set Bag Net (SBN) is locally used as a static gear to trap the sergestid shrimps (locally known as udang geragau) in the estuarine waters of Merbok River in the state of Kedah, Peninsular Malaysia. It is a fixed narrowing net, similar to a trawl net, set in the tidal stream by attaching it to hold-fasts. It has a rectangular mouth kept open by two vertical bamboo poles. The net is held in a fishing position against the current by linking the extended sides of the net (wing tips) to hold-fasts by means of long bamboo poles and steel wires. The hold-fasts are two wooden stakes fixed some distance apart in the sea bed, so that the net is parallel to the direction of the current. The mesh size decreases from 3.0 cm at anterior section to 0.5 cm at the cod end. Similar types of nets are also been used in other *Acetes* fishing areas in the Peninsular (Amin *et al*., 2008a; Oh *et al*., 2010). Bag net fisherman normally carried out its operation during the daytime

by setting the mouth of the net against the flow of tide. The SBN traps sergestid shrimps that drift with current or do not swim fast enough along the estuarine bank. There is large population of *Acetes* shrimps that live along the shallow western coastal waters of the Malay Peninsula and a significant proportion of coastal fishermen are involved in the fishing of this small shrimps.

Despite its long years of operation, no published data is yet available on its catch composition. Although some studies on population biology of the genus *Acetes* have been earlier reported (Amin *et al.*, 2008a-c, 2009a-c; Arshad *et al.*, 2007, 2008), information is still particularly scarce on the fishery of SBN in the coastal waters of Kedah. The fishery statistics available is inadequate due to the fact that most *Acetes* shrimps caught are locally consumed and they are not been landed at fish landing jetties in the country. Over years, it is predicted that the small mesh size net used in the operation may lead to the overexploitation of aquatic species co-existing in the estuarine area. Thus, the present objective of the study was to examine the set bag net catch composition and the annual temporal variation of these SBN catches in the study area.

MATERIALS AND METHODS

Study area and sampling gear: Samples were collected monthly from the local SBN fisherman of Merbok River (N 5° 40' 48" and E 100° 22' 5"), coastal area of Kedah, Peninsular Malaysia (Fig. 1) between June 2008 and May 2009. The fisherman used SBN for fishing sergestid shrimps

Fig. 1: Geographical local of the sampling station (•) in the estuary of Merbok River, Kedah. Peninsular Malaysia

in the estuary of Merbok River. The SBN is fixed mostly between 2 and 3 m depth along the shallow waters fringing the upper estuary. The mesh size of SBN is around 0.5 cm at cod end. Fresh samples for study were taken from fisherman immediately after hauling and preserved in 10% formalin for laboratory analysis.

Sample processing: In the laboratory, 200 g of *Acetes* sub sample in three replicates were taken from the total catch of every month. The three major groups comprising of the *Acetes* sp. other non-*Acetes* shrimps and juvenile fishes were sorted out during the twelve consecutive months.

Species identification and data analysis: *Acetes* specimen was taxonomically identified under a dissecting microscope with particular reference to the study of Omori (1975). Identification for juvenile fishes and other decapod shrimps were done based on the study of Mohsin and Ambak (1996) and Lovett (1981), respectively. Each taxa group was individually counted. Average percentage composition of different taxa groups was calculated from monthly sub sample data.

RESULTS

Catch category and monthly abundance: There were three main groups of fish resources observed from the catches of bag net in the study area (Fig. 2). The dominant one was *Acetes* shrimps (89%) and followed by the fish juveniles (9%) and other non-*Acetes* shrimps (2%). Monthly variation of different groups of SBN catches (No. of individuals / 200 g sample) are presented in Table 1. The average monthly number of *Acetes* was calculated at 1941.18 (individuals/200 g sample). The highest abundance (5116 individuals/200 g sample) of *Acetes* samples was observed in May and the lowest number (861 individuals/200 g sample) was found in October. While for the non-*Acetes* shrimps category, the annual average number was 43.81 (individuals/200 g sample). The lowest abundance (6 individuals/200 g sample) was recorded in April and the peak abundance (106 individuals/200 g sample) was seen in October. The estimated annual average number of juvenile fishes was 202.72 (individuals/200 g sample). The highest number (632 individuals/200 g sample) of juvenile fish was observed in the month of June while the lowest (60 individuals/200 g sample) was recorded in March.

Composition and temporal variation of *Acetes* shrimps: Three different species of sergestid shrimps (*A. japonicus, A. vulgaris and A. indicus*) were recorded in the study area (Table 2). The

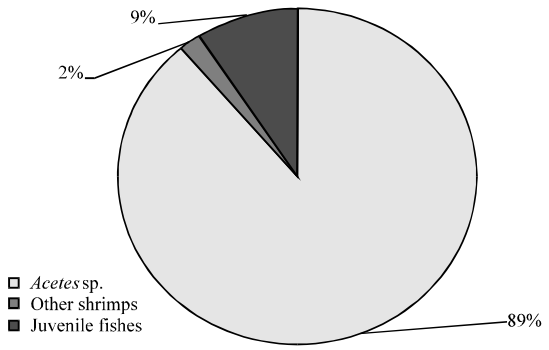

Fig. 2: Annual percent composition of SBN in the estuary of Merbok River, Kedah, Peninsular Malaysia

Table 1: Monthly variation of catches (No. of individuals/200 g sample) of SBN in the estuary of Merbok River, Kedah, Peninsular Malaysia

Month	*Acetes* sp.	Non-*Acetes* shrimps	Juvenile fishes	Total catch
	(No./200 g)			
Jun	1194	55	632	1881
Jul	1111	69	293	1473
Aug	1154	40	238	1432
Sep	1384	46	85	1515
Oct	861	106	133	1100
Dec	1058	31	118	1207
Jan	4018	54	156	4228
Feb	1120	41	214	1375
Mar	1217	26	60	1303
Apr	3120	6	181	3307
May	5116	8	120	5244
Ave	1941.18	43.81	202.72	2187.72
SD	1169.17	20.16	102.92	1130.14
Range	861-5116	6-106	60-632	1100-5244

Table 2: Monthly species composition (No. of individuals/200 g) of SBN in the estuary of Merbok River, Kedah, Peninsular Malaysia

Major groups/Species	Jun/08	July	Aug.	Oct.	Nov.	Des.	Jan/09	Feb.	Mar.	Apr.	May
Acetes											
A. japonicus	600	400	822	1000	424	700	810	1064	588	1400	1060
A. vulgaris	68	54	40	20	-	-	88	140	6	20	100
A. indicus	32	60	-	40	20	100	-	-	126	-	-
Juvenile fishes											
Sphyraena puthamiae	20	-	14	2	22	-	202	24	-	-	10
Trichiurus lepturus	84	-	-	-	12	-	-	-	-	16	4
Lagocephalus lunaris	52	2	30	40	164	60	-	-	10	34	8
Setipinna spp	60	-	-	140	6	-	26	64	20	40	22
Monodactylus argenteus	206	-	-	6	30	22	-	-	30	-	128
Pampus chinensis	2	2	-	-	-	-	-	6	-	34	-
Scatophagus argus	-	4	-	14	-	-	4	-	-	2	-
Other non-*Acetes* shrimps											
Penaeidae	44	70	4	106	46	6	54	40	26	2	8

overall annual percentage composition of *A. japonicus, A. vulgaris and A. indicus* were found to be 89, 7 and 4%, respectively. Higher density (>80%) of *A. japonicus* was recorded almost every month in the study area (Table 2).

Composition and temporal variation of juvenile fishes: Seven species of juvenile fishes were collected together inside the set bag net in the study area. They were *Sphyraena puthamiae*, *Trichiurus lepturus*, *Lagocephalus lunaris*, *Setipinna taty*, *Monodactylus argenteus*, *Pampus chinensis* and *Scatophagus argus*. Highest number of juvenile fishes was observed in the month of June in the study area (Table 2).

Non-*Acetes* shrimps: Only prawn from family Penaeidae was recorded as the other non-*Acetes* shrimp of the SBN catches during the study period. The highest number (106 individuals/200 g sample) of non-*Acetes* shrimps was found in October and the lowest number was recorded in April (2 individuals/200 g sample).

DISCUSSION

Set Bag Net is effective to be used as an alternative fishing gear for the catching of *Acetes* resources besides trawl and push nets. In fact its application has been quite extensive in the country although the actual choice of the *Acetes* fishing gear is somehow limited by the sea bottom contours and tidal flow. There is no apparent published information regarding the catch composition of SBN fishery in the 60's and 70's in Malaysia. Catch composition of Estuarine Push Net (EPN) from Malacca and Estuarine Set Bag Net (SBN) from Johor state have been recently reported from Peninsular waters (Amin *et al*., 2008a-c; Oh *et al*., 2010).

In the present study, it was found that *Acetes* shrimps showed the highest level of total catches and showed highest percentage (89%) while juvenile fishes (9%) and other non-*Acetes* shrimps (2%) were present in insignificant proportion. This trend of catch composition showed similar consistency with the study reported by Tham (1954) for Singapore waters where the major catch composition was also *Acetes*. Statistics gathered shows wide fluctuation in abundance of *Acetes* with month as this shrimp is known to show great fluctuation in existence. However, the trend of catch composition group is similar with the Estuarine Push Net (EPN) in the Malacca state where push net is adopted as the main fishing gear, *Acetes* shrimps (90%) was also the main catch followed by the juvenile fishes (9%) and other non-*Acetes* shrimps (1%) (Amin *et al*., 2008a).

Three species of *Acetes* shrimps *A. japonicus* (89%), *A. vulgaris* (7%) and *A. indicus* (4%) were identified from the present study. Two of three species are the main species that are known to occur in the western coast of Peninsular Malaysia. Amin *et al*. (2008a) reported three species of *Acetes* shrimps (*A. indicus* 87%, *A. japonicus* 12% and *A. intermedius* 1%) from the push net operation in the coastal waters of Malacca, Peninsular Malaysia. It is observed that *A. japonicus* is the dominant *Acetes* species in the Kedah estuarine waters. This is in contrast to the southern region of the western coast of Peninsular where *A. indicus* is the dominant species (Amin *et al*., 2008a). This information further refines the species and geographical distribution of *Acetes* in Malaysian waters. The existing results again support the previous data of the *Acetes* operation in Johor state (bordering Singapore) by Oh *et al*. (2010). Both the studies (Amin *et al*., 2008a; Oh *et al*., 2010) showed that the gear is very species selective.

In Bangladesh it is a destructive gear because most of the catches are juvenile (Khan *et al*., 1994). About 185 species of fish are exploited by fishermen operating estuarine set bag nets in Bangladesh. These include 15 species of penaeid shrimp, three nonpenaeids, nine freshwater prawns, three crabs, three molluscs, 90 pelagic finfish and 62 demersal finfish (Islam *et al*., 1992). The bag net has been the important *Acetes* fishing gear to the traditional fishermen in Peninsular Malaysia due to its simple operation and cheaper to use. Although, seven species of juvenile fishes were recorded from this study their total abundance was very small (9%). Therefore, it could be suggested that the bag net operation is not showing significant damaging effect to the juvenile fishes inhabiting the estuarine area.

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REFERENCES

Amin, S.M.N., A. Arshad, S.B. Shamsudin, S.B. Japar and S.S. Siraj, 2008a. Catch per unit effort of estuarine push net with emphasis on occurrence and abundance of Acetes shrimps in the coastal waters of Malacca, Peninsular Malaysia. Pertanika J. Sci. Tech., 16: 281-289.

Amin, S.M.N., A. Arshad, B. Japar Sidik and S.S. Siraj, 2008b. Growth, mortality and yield-per-recruit of sergestid shrimp, *Acetes intermedius* Omori, 1975 (Decapoda: Sergestidae) from length frequency analysis in the coastal waters of Malacca, Peninsular Malaysia. Pertanika J. Trop. Agric. Sci. 31: 95-106.

Amin, S.M.N., A. Arshad, Z. Zainal, M.H. Idris, S.S. Siraj and S.B. Japar, 2008c. First distribution records of *Acetes intermedius* (Decapoda: Sergestidae) from the coastal waters of Bintulu, Sarawak: Population structure, length-weight and length-length relationship. J. Sust. Sci. Manage., 3: 74-83.

Amin, S.M.N., A. Arshad, S.B. Japar, S.S. Siraj and S. Goddard, 2009a. Reproductive biology of sergestid shrimp *Acetes indicus* (Decapoda: Sergestidae) in coastal waters of Malacca, Peninsular Malaysia. Zool. Stud., 48: 753-760.

Amin, S.M.N., A. Arshad, S.B. Japar and S.S. Siraj, 2009b. Age structure, mortality and yield-per-recruit of sergestid shrimp, *Acetes indicus* (Decapoda: Sergestidae) from the coastal waters of Malacca, Peninsular Malaysia. J. Applied Sci., 9: 801-814.

Amin, S.M.N., A. Arshad, S.S. Siraj and S.B. Japar, 2009c. Population structure, growth, mortality and yield per recruit of segestid shrimp, *Acetes japonicus* (Decapoda: Sergestidae) from the coastal waters of Malacca, Peninsular Malaysia. Indian J. Mar. Sci., 38: 57-68.

Arshad, A., S.M.N. Amin, S.S. Siraj and S.B. Japar, 2007. New distribution records of sergestid shrimp, *Acetes intermedius* (Decapoda: Sergestidae) from Peninsular Malaysia with notes on its population characteristics. J. Biol. Sci., 7: 1305-1313.

Arshad, A., S.M. Nurul Amin, G.T. Yu, S.Y. Oh, J.S. Bujang and M.A. Ghaffar, 2008. Population characteristics, length-weight and length-length relationships of *Acetes vulgaris* (Decapoda: Sergestidae) in the coastal waters of Pontian, Johor, Peninsular Malaysia. J. Biol. Sci., 8: 1298-1303.

Islam, M.S., M.G. Khan, S.A. Quayum and S.Z.A. Chowdhury, 1992. Estuarine set bag net fishery of Bangladesh. Marine Fisheries Survey Management and Development Project, Dept. of Fisheries, Chittagong, Bangladesh.

Khan, M.G., M.S. Islam, M.G. Mustapha, M.N. Sada and Z.A. Chowdhary, 1994. Biosocioeconomic assessment of the effect of the estuarine set bag net on the marine fisheries of Bangladesh. FAO, Bay of Bengal Programme (BOBP), BOBP/WP/94.

Lovett, D.L., 1981. A Guide to the Shrimps, Prawns, Lobsters and Crabs of Malaysia and Singapore. 1st Edn., Faculty of Fisheries and Marine Science, UPM, Malaysia, pp: 156.

Mohsin, A.K.M. and M.A. Ambak, 1996. Marine Fishes and Fisheries of Malaysia of Malaysia and Neighbouring Countries. 1st Edn., Universiti Pertanian Press, Serdang, Selangor, Malaysia, pp: 744.

Oh, S.Y., A. Arshad, S.P. Pang and S.M.N. Amin, 2010. Catch composition of estuarine set bag net fishery in the coastal area of Pontian, Johor, Peninsular Malaysia. J. Biol. Sci., 10: 247-250.

Omori, M., 1975. The systematics, biogeography and fishery of epipelagic shrimp shrimps of the genus *Acetes* (Crustacea, Decapoda, Sergestidae). Bull. Ocean Res. Inst. Univ. Tokyo, 7: 1-91.

Tham, A.K., 1954. The shrimp industry of Singapore. Indo-Pacific Fish Conf., 5: 144-155.