Vidyodaya J. Sci., (1991) *Vol.* 3, *No.* 2, pp. 21 - 33

PRELIMINARY OBSERVATIONS ON THE PURSE SEINE FISHERY IN THE SOUTH-WEST COAST OF SRI LANKA

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Abstract

Purse seine fishing in the south west coast of Sri Lanka became popular since 1982 *and the number of boats increased to about* 29 *in* 1984. *In* 1987 *there were around* 50 *purse seiners operating in this region. A study of the purse seine fishery and its impact on other small scale fisheries were initiated in* 1985. *The paper presents the results of a survey for the period* 1985 *to* 1987.

Purse seine fishery is carried out only during the calm months (ie from October to April). 3 1/2 *ton boats with inboard engines are used in this fishery. The length of the nets range from* 150-210 *meters and has an average depth of about* 50 *meters.*

The average catch per unit effort for purse seiners for 1985/86 *season was about* 185.7 *kg/boat. The total production by the purse seine fishery in this area in* 1987 *was about* 250 *MT. This contributes to about* 30% *of the total small pelagic fish production in this region.*

Amblygaster sirm *dominates the purse seine catch. Other important species are* Decapterus russelli, Rastrelliger kannagurta *and* Loligo singhalensis. *Length frequency distribution studies of* A. sirm *show that the purse seiners fish in the same area and probably fish the same stocks as the small mesh gill netters in this region.*

Key words:- Purse-Seine fishery of Sri Lanka

1. Introduction

Purse seine is an efficient fishing gear that is used to exploit pelagic fish stocks. Purse seining in the study area is usually carried out at night with light attraction. This type of fishing was successfully tried out in Sri Lanka in 1972 by the UNDP/Sri Lanka fishery development project.

Purse seining in the south west coast of Sri Lanka (Fig. 1, Hikkaduwa/ Ambalangoda area) began somewhere in early 1980's with one or two purse seiners. In 1984 this number increased to 29 and in 1987 there were 59 purse seiners operating in the Galle DFEO division (District Fishery Extension Office). Due to the rapid expansion of the purse seiners in this region conflicts have arisen between the purse seiner and others using the same fish resources,

namely the small mesh gill netters and the beach seines. These two types of gear are less efficient than the purse seines but are used to fish the same stocks in this area. Purse seining is also a cost efficient method in that with less expenditure on fuel and labour more fish can be caught. This was the reason for such rapid expansion of this particular fishing gear. However, to control this fishery before it is too late, it is necessary to understand the nature of the fish stocks that are being fished by this gear, and the present level of exploitation.

A study was therefore initiated in 1985 and this paper presents some preliminary observation on the seasonal variation pattern in catch rates, species composition, production etc.

2. Material and Methods

The present study was carried out in Hikkaduwa/Ambalangoda areas in the Galle DFEO division (Fig. 1). In 1987 there were 59 purse seiners operating in this region. Of these 34 were operated in Hikkaduwa area, 19 in Ambalangoda and 6 in Balapitiya.

In the study area purse seining is carried out by using 3 1/2 tonners with a crew of about 10 members. The size of the net is 150-210 metre in length and 50 m in depth. The mesh sizes of the nets used in Hikkaduwa/Ambalangoda areas are usually 23 mm and 16 mm. Fishing is carried out at moonless nights by using lights powered by portable generaters to attract the fish. Fisher men in this area usually use 1500 watt lights. The area fished by the purse seine has a depth range of 30-80 meters.

Sampling of purse seiners and small meshed gillnets were carried out at two main landing sites in Hikkaduwa and Ambalangoda. These places were visited 4 days a month to collect information on catch and effort. The length measurements of the important species were taken at the landing sites.

3. Results

3.1 Seasonal variation patterns

In the south west coast of Sri Lanka purse seine fishing is carried out only during the calm months of the year (i.e., from October to April). Thus the fishery is highly seasonal and last only for 6-7 months during one season. In this fishery catch per haul is considered as the catch per unit effort.

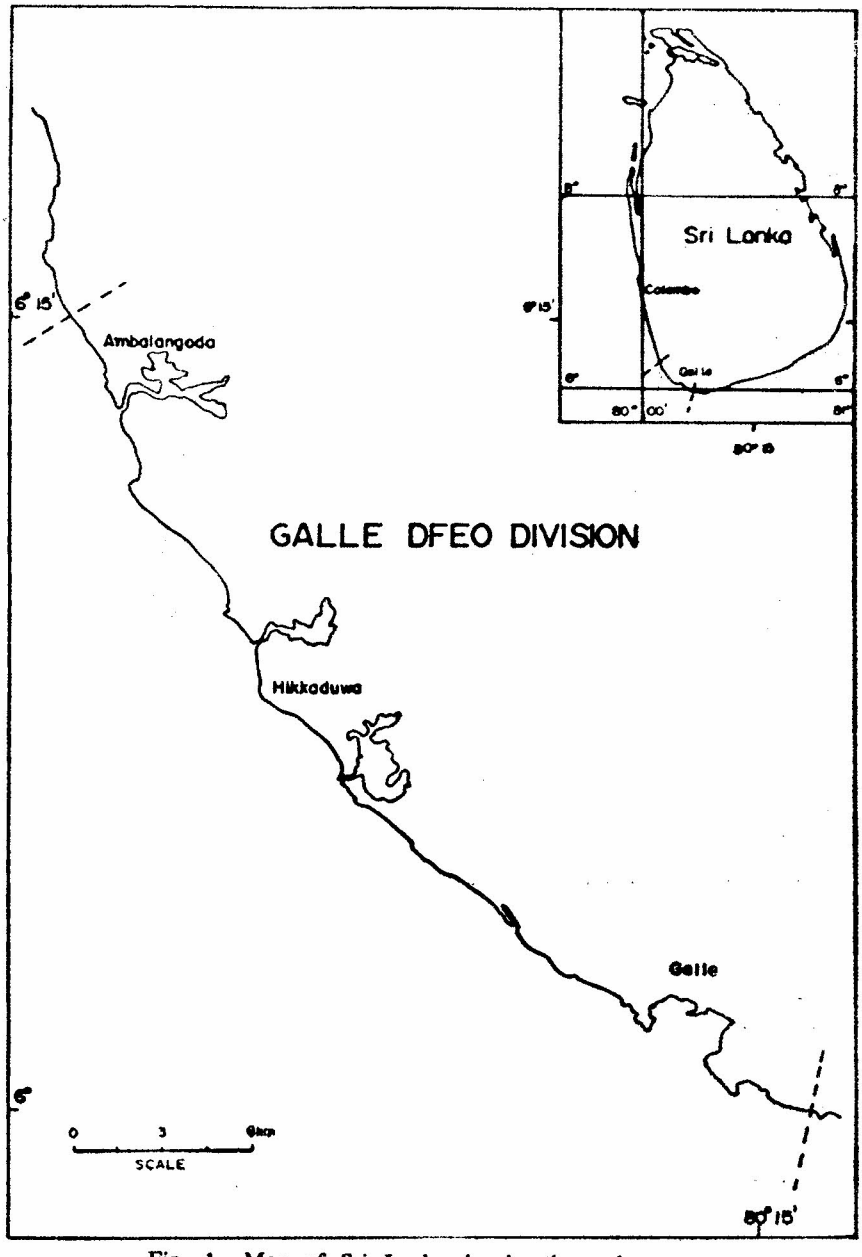

Fig. 1. Map of Sri Lanka showing the study area.

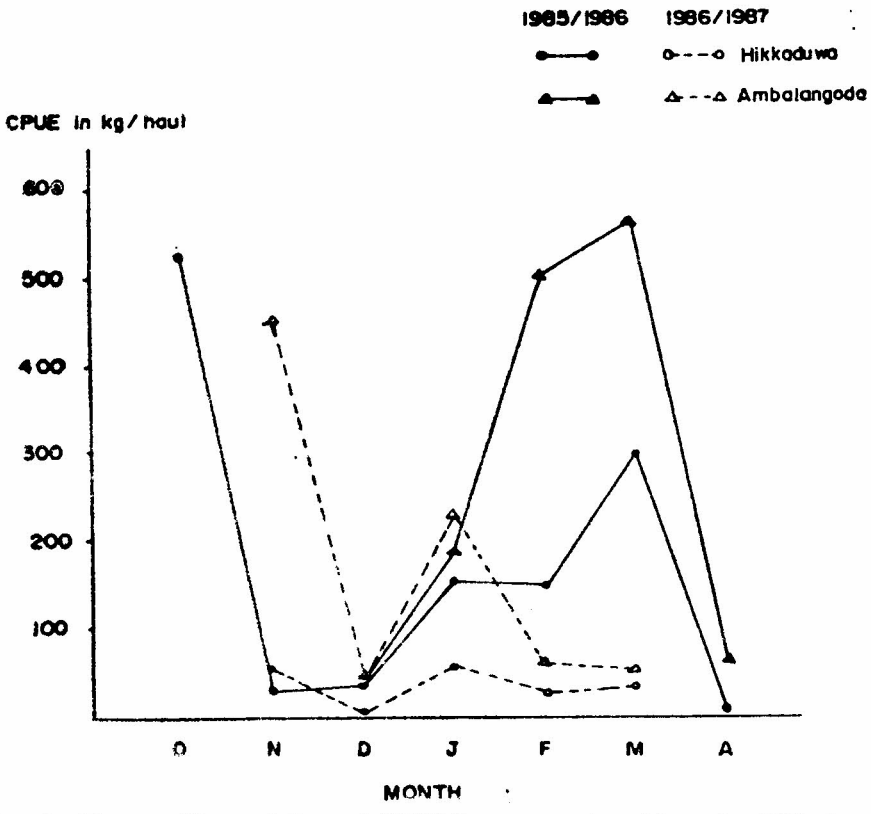

Fig. 2. The monthly variation of CPUE for purse seine fishery in Hikkaduwa/ Ambalangoda areas.

At the beginning the catch per unit effort (CPUE) for the two areas Hikkaduwa and Ambalangoda were treated separately. Fig. 2 shows the monthly variation pattern of catch per unit effort for the two successive fishing seasons. As the CPUE values are not normally distributed the non parametric statistical tests were used for analysis. Mann-Whitney test (Zar, 1984) was carried out to compare the CPUE of Hikkaduwa and Ambalangoda areas. Results are given in Table I.

Table 1. Man-Whitney test to compare the CPUE value of Hikkaduwa/Ambalangoda area.

Fishing season	Value of Mann-Whitney Statistics U	Critical value U. 0.05	Level of significance
1985/1986	17	23	n.s.
1986/1987	20	23	n.s.

There was no significant difference between the CPUE of Hikkaduwa and Ambalangoda in both fishing seasons. Hence these values were combined and a similar test was carried out to compare the CPUE values for the two seasons. The value obtained for the Mann-Whitney statistic (U) is 26. This was not significant at 0.05 level but a significant difference was observed at 0.02 level.

During the 1985/1986 fishing season higher catch rates were found at the beginning of the season (i.e., in October) and just before the end of the season (i.e., in March) (Fig. 3). Highest catch rates of about 500 kg/boat were observed during 1985/86. The average catch per unit effort estimated for this season was 185.7 kg/boat.

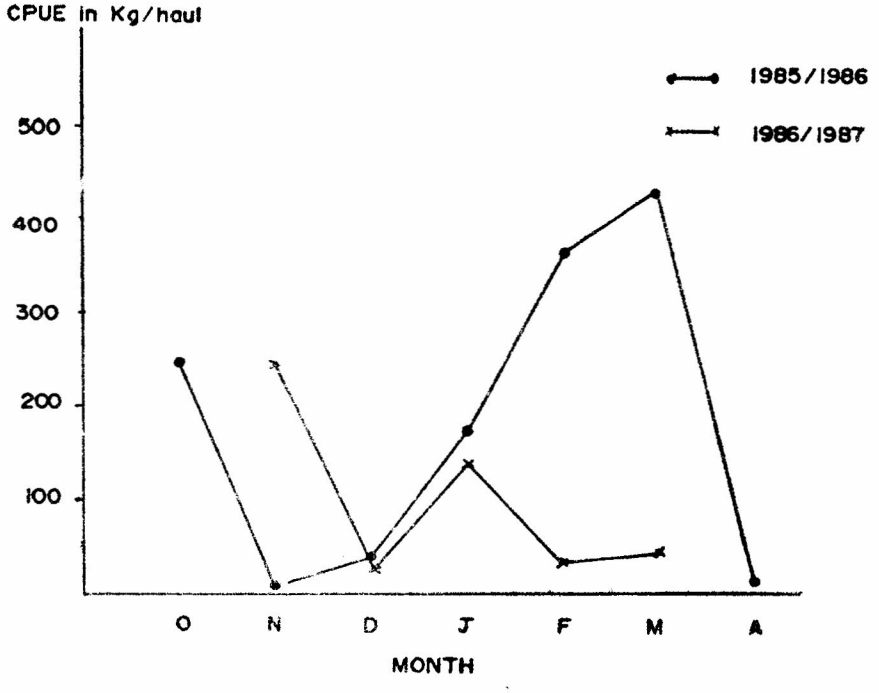

Fig. 3. The monthly variation of CPUE for purse seine fishery in the south west region.

The variation pattern in monthly mean catch rates for the period 1986 October to 1987 April is some-what different from that of the previous season. Fishing was begun in November with a very high catch rate especially in Ambalangoda area. However the catch rates for other months were very poor compared to that of the previous season. The mean catch rate for this season has dropped to 94.1 kg. This is about 50% drop in catch rate.

3.2 Production by purse seines

In 1985, when the present study was initiated, the number of purse seiners in the Galle DFEO division were 44. This has now increased to about 59 in 1987. However the total number of purse seines operated per day varied from time to time. Fig. 4 shows the variation pattern of the effort (No. of boats operated per day) and the total production by these boats. The average of the total number of boats operated per day was 16 (S.D. = 7.7) for the season 1985/86 and for the season 1986/87 it has increased to 22 (S.D. = 1.87) increase was however not significant at the 95 percent level of significance (t value = 0.48, Zar, 1984).

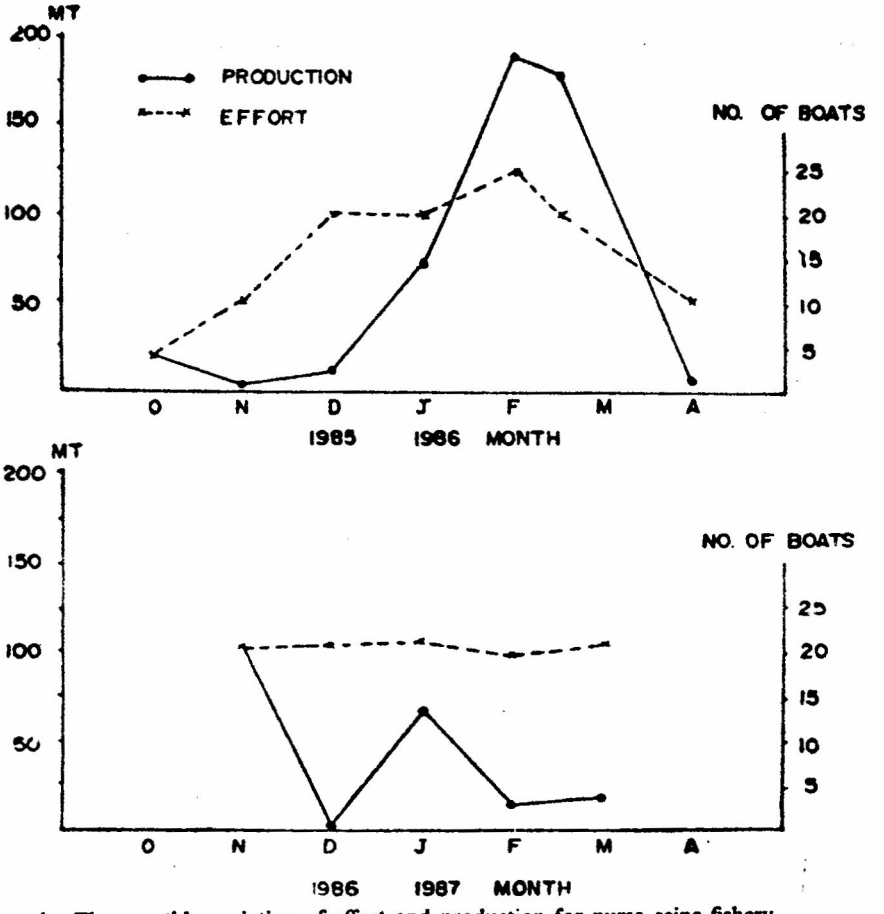

Fig. 4. The monthly variation of effort and production for purse seine fishery.

The average CPUE estimated for different fishing seasons was used to calculate the total annual production. The estimated production for the two fishing seasons in 1985/86 and 1986/87 are 298 MT and 210 MT respectively. The total purse seine production contributed to about 30% of the total small pelagic fish production in the Galle DFEO division which were 1132 MT and 994 MT for 1985 and 1986 (Anon, 1986).

3.3 Species composition of the purse seine catch

In Hikkaduwa/Ambalangoda areas purse seine fishery is carried out to exploit mainly the small pelagic fish resources. Although this is a multi-species fishery, the number of species caught by this gear is not so high as those reported for the small meshed gillnet fishery (Dayaratne, 1984). The main species caught in the fishery are sardines (mainly *Amblygaster sirm*) mackeral (*Rastrelliger* sp., *Decapterus sp.*,) and *Loligo singhalensis* (squids). Occasionally large number of rigate mackerals are also caught by this gear. Among others identified are other sardines (*Sardinella sp.*) Queen fish (*Chorinenus* sp.,) and seerfish (*Scomberoides*). Fig. 5 shows the seasonal change in species composition of the catches for the two successive years. The dominant species in this fishery is *Amblygaster sirm.* In general the contribution by this species is quite high except in few months. For the 1985/86 fishing season the percentage composition of this species ranged from 15-73%. However

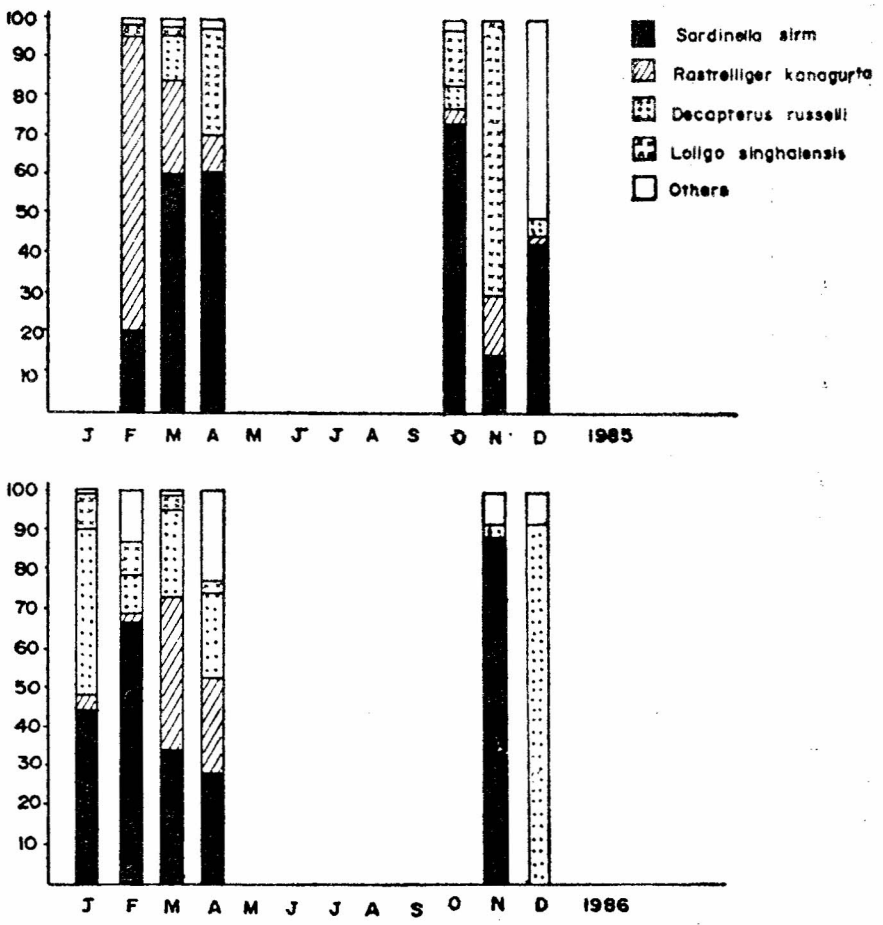

Fig. 5. The monthly variation in species composition of the purse seine fishery.

for the 1986/87 season the contribution by this species was high in certain months (eg. 87% in November) and almost nil catches were observed in some other months (in December).

The other important species caught in this fishery were the mackerals. The Indian mackeral (*Rastrelliger kanagurta*) and the scad mackeral (*Decapterus russelli*) together contribute about 30% of the total catch. Another important variety was the squid (*Loligo singhalensis*) a neritic species which is highly vulnerable to light attraction.

3.4 Incidental catches

Fishermen engaged in purse seining in this area are also in the habit of carrying out hand lining operations while they are out at sea. The observed catch rates for hand lining was relatively low when compared to that of purse seining. However during the lean period for purse seine the catches by handlining was high. Highest catch rates for handline was observed in December (Fig. 6). The average catch per boat for handlining at Hikkaduwa/Ambalangoda areas were not significantly different (Mann-Whitney test, Zar, 1984).

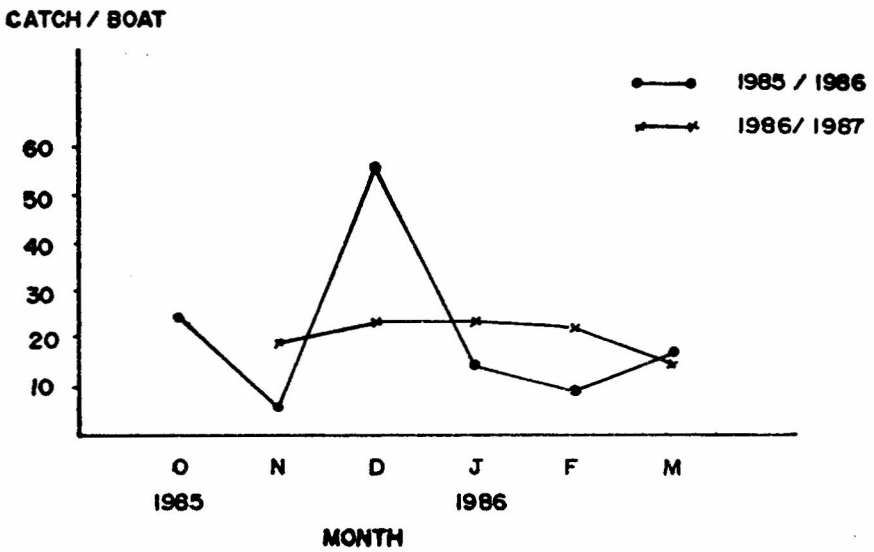

Fig. 6. The monthly variation of CPUE for Hand lining.

The average catch rate for handlining was 18.5 kg/boat and 20.4 kg/boat for the two fishing seasons in 85/86 end 86/87 respectively. Unlike in purse seining, the fish caught by handlining were mainly demersal varieties. Species belonging to the Families Lethrinidae, Lutjianidae and Pomodasydae were the major contributers. In addition to the demersals the pelagic varieties that were usually caught by the seiners were also caught by handlining. eg: Indian mackeral and scad mackeral.

3.5. Other fisheries in the study area

The small pelagic fish resources in Hikkaduwa/Ambalangoda areas are also exploited by other fisheries such as small mesh gillnet fishery and beach seine fishery. The small mesh gillnets in this area are operated by 5-6 m FRP boats and mechanised and nonmechanised dug out canoes (orus). According to the Ministry of Fisheries craft statistics the number of crafts registered in the Galle DFEO area are as follows:

Craft type	Number
5-6 M FRP	142
Dugout canoes (Mechanised)	35
Dugout canoes (Non mechanised)	550
Madel-crafts	124

Small mesh gillnet with 28 mm and 32 mm mesh are used for sardines and a mesh of 51-64 mm are used for mackeral and others. The mean catch per boat per day of FRP craft was estimated at 55.80 kg and 43.9 kg in 1985 and 1986. For the traditional crafts the CPUE were 17.6 kg and 29.8 kg for 1985, and 1986 respectively.

The estimated annual production by the small mesh gillnets operated by FRP boats were 133 MT and 105 MT for the years 1985 and 1986 respectively. These nets operated by the traditional fishing craft (oru) has produced a total of 42.2 MT and 71.5 MT for the years 1985 and 1986 respectively. Thus the estimated total average production by this fishery was 175.8 MT/annum. This production is 15-18% of the total small pelagic fish production in the Galle DFEO division. The other important fishery for small pelagics in this area was the traditional beach seine fishery. This fishery was however not monitored due to lack of transport facilities and manpower.

3.6 Size composition of the catches

Length frequency distributions of the important species caught by purse seines are shown in Figs. 7 & 8. As the purse seine is a relatively less selective gear compared to other gears such as gillnets, the size frequency distributions of most of the species has a wide range (Fig. 7).

The length frequency distribution of the most common species i.e., *Amblygaster sirm* caught by purse seine and by the small mesh gillnets are shown in Fig. 8. It was observed that the size range of *A. sirm* caught by these two gears are more or less the same. This is a clear indication that both purse seine and

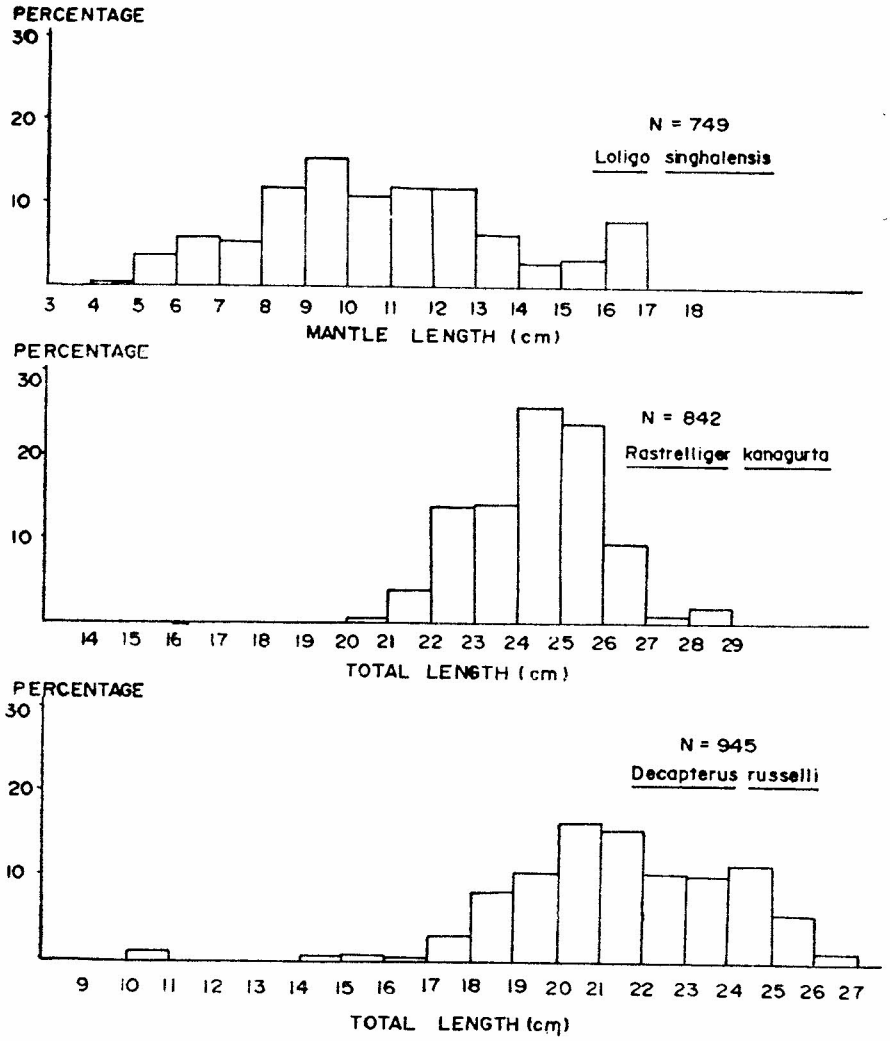

Fig. 7. Length frequency distribution of *Loligo singhalensis*, *Rastrelliger kanagurta* and *Decapterus russelli* from purse seines.

small mesh gillnets fish in the same area and probably exploit the same fish stocks. Althoigh gillnet is a highly selective gear the similar size range of *A. sirm* in purse seines and gillnets is a clear indication that fishermen have selected the best suitable mesh to catch the available size of sardine in this area. The narrow size range of *A. sirm* in both these gears could probably be due to a possible migration of a certain size class to the fishing area and also probably due to schooling by size.

4. Discussion

The seasonal variation pattern of the catch rates seem to differ from year to year. In the 1985/86 fishing season, peak catch rates were observed in October and March, whereas in the 1986/87 fishing season the peak catches

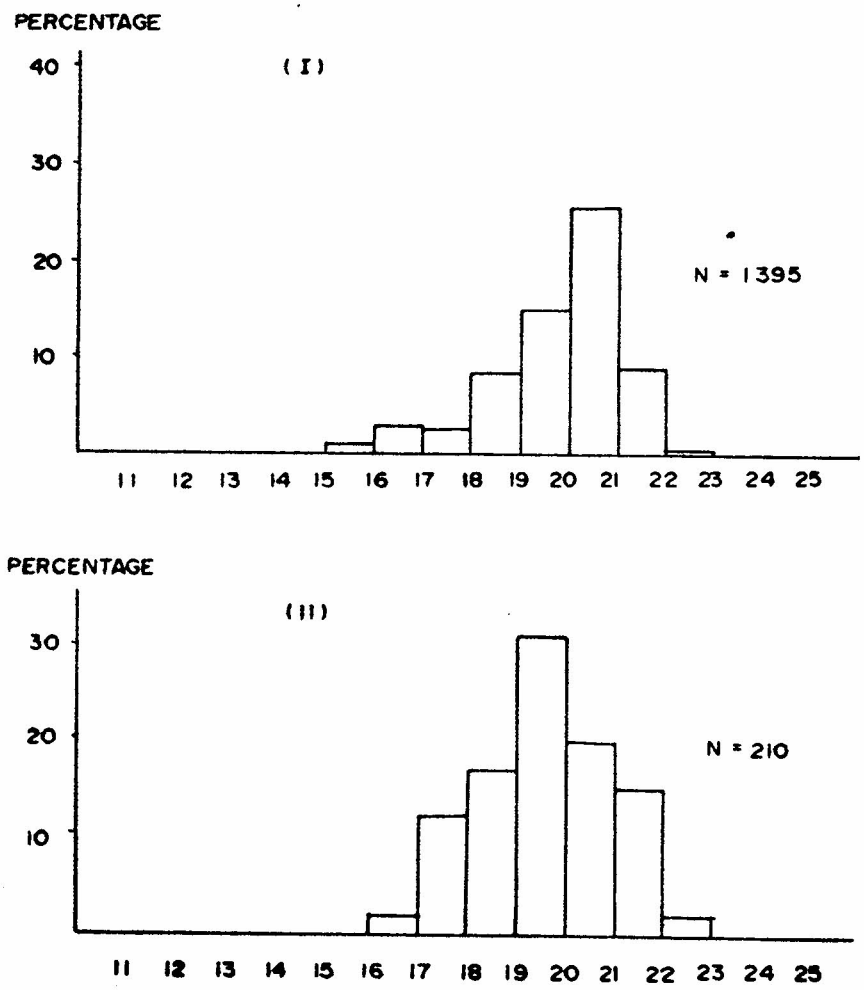

Fig. 8. Length freqiency distribution of *Amblygaster sirm* from I. Purse seines II. Small mesh gill nets.

were observed in November and January. This difference could probably be related to the difference in the onset of monsoon and other oceanographic factors which are directly related to the migration of the small pelagic stocks towards the shore. It seems that the relative abundance of fish stocks vary from month to month. Even with an increase in fishing effort, the catch per unit effort has remained high during the period January to March 1985 indicating a greater relative abundance of the stocks. However in both years high catch rates were observed at the beginning of the fishing season.

Although the number of boats operated for purse seining were more or less the same for the two successive fishing seasons, the total production by this fishery has decreased. This year to year variation in production is characteristic of many pelagic fish stocks specially the short lived species such as sardines.

The present catch rates were low when compared to those obtained by experimental fishing. In 1972/73 period a purse seiner with a slightly different net (234 m length and 30 m depth) operating in the SW region has obtained catch rate of 360 kg per operation (Pajot, 1977). In 1973/74 period, operations with a slightly smaller net (170 m length, 30 m depth) have resulted in catch rates of about 413 kg/set (Joseph, 1975). The high catch rates obtained during the experimental fishing in 1972/1974 period were due to the use of high intensity bulbs of 1500-3000 watts in the night and the use of echosounders for detection of fish schools in day time. The commercial fisheries carried out at present are not allowed to use bulbs of high intensity (i.e., greater than 1500 watts) through the gazette notification No. 473/46 dated 19.01.1987. They are also not using any echosounder to detect fish schools.

The species composition of the catches of the present fishery when compared with that of the experimental fishing carried out by the UNDP/FAO project in 1973 showed a marked difference. According to Joseph (1973) 68% of the catch was composed of sardines, 7% herring 8% anchovies 4% red bait and the rest was composed of other spp. such as mackerals squids & silver bellies. The catches of the present fishery consist mainly of herrings and mackerals. Sardines (*Sardinella gibbosa*) and red bait (*Dipterygonotus leucogrammicus*) were rarely seen among the catches. A possible reason for the difference in the species composition of the catches in the present study and those of the experimental fishing conducted in 1972/1973 could be the difference in light intensity, use of echosounder, difference in the area of operation (i.e., distance from the shore) or could be that the present study was based on commercial fisheries where the fishermen target marketable fish resources while the experimental fishing aimed at red bait and/or could be an year to year variation of the abundance of the different types of small pelagic fish resources.

In Sri Lanka, the inshore small scale fisheries provide the bulk of the fish catch but the knowledge of the resource and level of exploitation is poor especially in the south west coast. Therefore, it is important to consider whether our fish resources could support an expanded purse seine fishery in the inshore coastal waters on a sustained basis. It is reported that the purse seiners operated in Hikkaduwa/Ambalangoda area are fishing in nearshore waters within 7 miles from the shore. As the small pelagic stocks in this area are also fished by the beach seiners and small mesh gill netters, conflicts have already arisen between the purse seiners and the others using traditional fishing methods.

Considering all these facts the Ministry of Fisheries introduced the purse seining net fishing regulation under the fisheries ordinance (Extraordinary Gazette No. 473/46 dated 19.01.1987). These regulations include a licence fee, restriction to fishing gear (length, meshsize, power of the light) and area of operation. The number of permits to be issued to each DFEO division were limited. The number of purse seiners in Hikkaduwa/Ambalangoda area were allowed to remain at the present level.

The purse seine fishery and the small mesh gillnet fishery in the Hikkaduwa/Ambalangoda areas seem to fish the same 'stocks'. As the status of the stocks exploited by the purse seiners are not yet assessed, continuous monitoring of the fishery has to be carried out so that the number of permits issued to the purse seiners could be controlled.

5. Acknowledgements

I want to thank the Research Assistant T. Upasena and Laboratory Attendant B. D. Benjamin for the help given in the field in collection of data

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