

STUDIES ON LENGTH FREQUENCY OF OILSARDINE AT CALICUT DURING 1970-71 to 73-74

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ABSTRACT

Studies at Calicut on age and growth of oilsardine *Sardinella longiceps* by means of length-frequency method indicated that the oilsardine attains the total length of 125-130 mm at the end of one year, 165-175 mm at the end of two years and 180-190 mm on completion of three years. From the monthly progression of modes during different years, it could be seen that the fishery was mainly supported by the 0-year, 1-year and 2-year classes. The studies also revealed that the growth during the first year was more accelerated than during the rest of its life span.

INTRODUCTION

Divergent opinions have been expressed about the age and growth of the oilsardine *sardinella longiceps* Valenciennes, by most of the earlier investigators. The first report on age and growth of the oilsardine was by Hornell and Nayudu (1924) who recorded a very rapid growth in the early life, and they suggested that the normal life span of the fish was probably 2½ years. Chidambaram (1950) estimated the lengths at the end of one, two, three and four years as 100, 145, 183 and 205 mm. respectively, based on length-frequency studies. This was in agreement with the later observations of Nair (1953). Sekharan (1965) stated that the sizes of one-year and two year olds can be regarded as 100 mm. and 150 mm. respectively, and this was in agreement with the observation of Prabhu (1966). Balan (1968) found that the average length of 1-year, 2-year and 3-year olds were 143 mm. 164 mm. and 184 mm. respectively. Prabhu and Dhulkhed (1972) observed that the sizes attained at the end of first, second and third year were 100 mm. 110 mm. 150 mm. and 175-180 mm. respectively. Antony Raja (1972) reported that the sizes of the oilsardine at the end of one and two years were 150-160 mm. and 170-180 mm. respectively. To collect further information on the age and growth of this commercially important fish, the present investigation was carried out during the period from 1970 to 1974 at Calicut which is one of the major sardine fishing centres of the south west coast of India.

MATERIAL AND METHODS

Samples were collected on all the fishing days (each sample consisting of not less than 50 numbers) at Vellayil fish-landing centre, Calicut, from the catches of the boat-seine *Pattenkolli vala*. The total-length of each fish was measured to the nearest 0.1 cm. and each individual sardine was weighed the nearest 0.5 g. after removing the excess surface moisture with a blotting paper or a towel. The numbers of the fish for each 5 mm. interval were calculated for each sampling day. From these the estimates of total numbers were made for each month during the entire period of this investigation by following the method adopted by Sekharan (1965) and Balan (1971).

LENGTH-FREQUENCY DISTRIBUTION

The length-frequency data based on sample from the nonselective gear *Pattenkolli vala*, are given in Fig. 1. The Petersen's method of tracing the progression of modal lengths in the length-frequency distribution during the various months was followed in the present study.

Taking into consideration the progression of modes during different years, it could be seen from fig. 1. that the mode A1 at 105 mm. of July 70 could have arisen as offspring of a late spawning in September 1969. It progressed to 125 mm. in September 70 and 170 mm. in August 71. The same mode further shifted to 180 mm. in August 72. This indicates that it has attained a growth of 125 mm. at the end of one year, 170 mm. at the end of two years and 180 mm. on completion of three years. Similarly, the mode A2 at 125 mm. in October 70 represents the one year old fish, which progressed to 170 mm. in August 71, then merged with A1 as a single mode A and further progressed to 180 mm. in August 72, thereby completing three years. Mode B. at 150 mm. in July 70, can probably represent offspring of the spawning during July-August 1968; these would have attained at least 125-130 mm. in September 69 and 165 mm. in September 70. This mode further shifted to 185 mm. in May 71. Mode C at 175 mm. in July 70 represents the two-year old fish, which progressed to 190 mm. in April 71 and completed three years. The mode D1 at 140 mm. in September 70 and D2 at 150 mm. in October 70 might be the offspring of the spawners of June-July 69. These two modes would have attained a length of 125-130 mm. in June-July 70. While D1 progressed to 165 mm. in May 71, D2 further shifted to 175 mm. in June 71 and thereby attained two years of age. The same modes D1 and D2 further moved to 180 mm. in October 71 and 185 mm. in August 71 respectively; thereafter the progression of these modes was not traceable in the catches. The 115 mm. mode E in August 71 would have been produced about ten months earlier. This batch of fish attained a growth of 125 mm. by September 71 and 165 mm. by September 72, as one-year old and two-year old fish respectively. This mode E was traceable further in a length of 185 mm. in May 73. Assuming that the

spawning had taken place during June-July 1971, the fish represented by modes such as F1 at 100 mm. in August 71 and F2 at 100 mm. in September 71 might be the offspring of that season. These two modes shifted to 130 mm. in May 72, 165 mm. in May 73 and 185 mm. in January 74. Mode G at

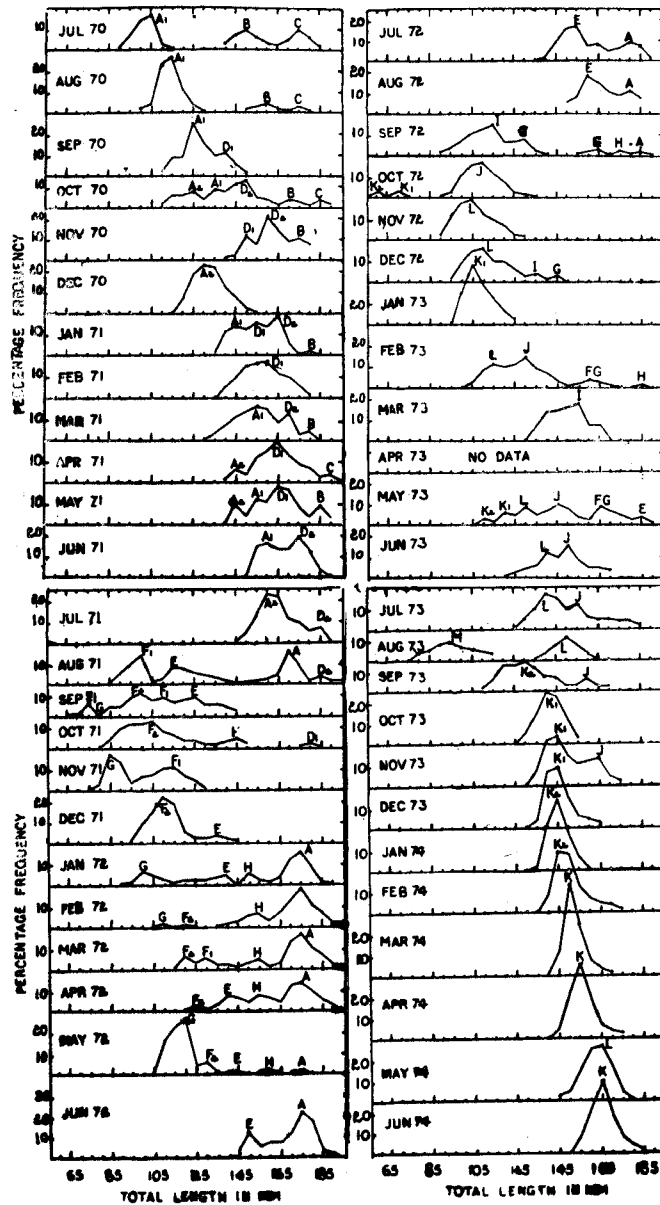


FIG. 1. Length frequency of oilsardine for the years, 1970-71, 71-72, 72-73 and 73-74.

75 mm. in September 71 shifted to a length of 120 mm. in May 72 and 130 mm. in September 72. The same mode G further moved to 165 mm. in May 73 (representing two-year old sardine) and 185 mm. in January 74 (as three-year old). Another mode H at 145 mm. in October 71 would be representing the offspring of the spawning of July-August 1970, which might have attained a length of at least 125-130 mm. during July-August 71. This further moved to 165 mm. in July 72 and to 185 mm. in February 73. With the assumption that the spawning period extended up to September during 1972-73 season, the modes such as K1 at 70 mm. and K2 at 60 mm. in October 72 might represent the offspring of the late spawners. These advanced to 130 mm. at the end of one year i.e. in September 73 and 165 mm. by June 74. The 105 mm. mode L in November 72 probably represents the offspring of the spawning in June-July 1972, which progressed to 130 mm. in May 73 and 165 mm. in May 74; thereby these fish completed two years. The 95 mm. mode M of August 73 was not traceable during rest of the months; perhaps, it would have attained a total length of 125-130 mm. by June-July 1974.

From the progression of length modes such as A1, A2, B, C, D1, D2, E, F1, F2, G, K1, K2 and L, it is reasonable to infer that the soil sardine attains the length of 125-130 mm. at the end of one year, 165-175 mm. at the end of two years and 180-190 mm. on completion of three years. The length increment observed between the one-year olds and two-year olds is about 35-45 mm. and that between two-year olds and three-year olds is about 10-20 mm.

Average growth:

The monthly length-frequency data for all the four seasons were pooled (Fig. 2) to get an overall annual growth picture. Length mode 1 at 105 mm. in July progressed to 165 mm. in next June. This mode 1 might represent the progeny of the spawning during late September of the previous season. It would have shifted to at least 125 mm. in September of the next season. Mode 2 at 155 mm. in July progressed to 185 mm. in next May and thereby the fish of this group completed three years. The mode 2 could be the offspring of the spawning which took place two years earlier. Mode 3 at 175 mm. in July represents the two-year olds, which further advanced to 190 mm. in the next January. The 125 mm. mode 4 in September moved to 175 mm. in the next June. Mode 5 at 105 mm. in October represents the offspring of the spawning during June-July of the same year; these grew to 130 mm. in next June, thereby completing one year.

DISCUSSION

Nair (1953) stated 100, 150, 190 and 210 mm. as the total lengths of the oilsardine at the end of 1, 2, 3 and 4 years respectively. Sekharan (1965), Prabhu and Dhulkhed (1967), Dhulkhed (1968) and Nair (1973) were in fair agreement with this. The length-frequency investigation conducted by the

present author during the four years has revealed that the oil sardine attains the total length of 125-130 mm. at the end of one year, 165-175 mm. at the end of two years and 180-190 mm. at the end of three years, thereby indicating rapid length increment during the first twelve months of its life. Balan (1968) also reported fast growth i.e. 143 mm. on during the first twelve months based on detailed studies of oilsardine scales.

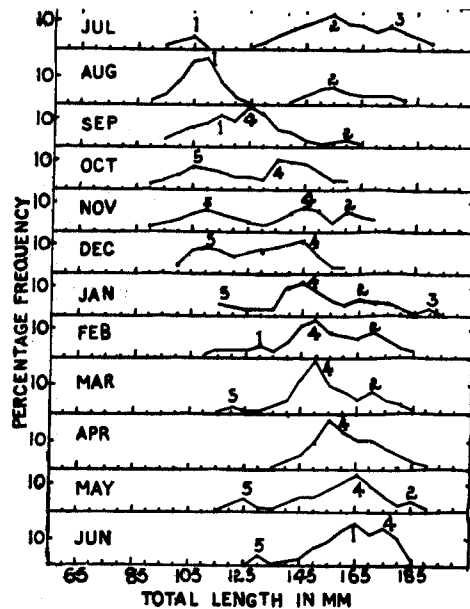


FIG. 2. Combined monthly progression of length of oilsardine for all the four years.

Chidambaram (1950) and Nair (1953) stated that the juveniles disappear at the end of one season and reappear in the succeeding season as mature and spawning sardines; the same view was later expressed by Bensam (1968). The mode K1 and K2 at 70 mm. and 60 mm. in October 72 progressed to 120 mm. and 110 mm. respectively in May 73, and afterwards disappeared from the catches till they reappeared at 130 mm. in September 1973 representing one-year-old sardine; thus this observation largely lends support to the view of earlier workers. Similarly, the mode G at 75 mm in September 71 was not traceable after May 72 when it attained the length of 120 mm, until it reappeared in the catch as 130 mm mode in September 1972 as one year old fish. Assuming that the spawning period extended from June to September, these broods could have originated as off springs of the late spawning. During the period of their disappearance from the fishery, the fish ranging from 145 to 160 mm in total length dominated the catch. According to Prabhu and Dhulkhed (1967),

the small sized oilsardine of 40 to 50 mm in total-length appear in large numbers in the fishery during August to October at Mangalore; these then disappear from the catch and the medium-sized fish ranging from 120 to 150 mm dominate the catches.

A salient feature observed during the present investigation was the entry of 0-year class (below 125 mm) during July-September period only and very rarely in October. It could be seen from the modes A1, A2, B, D1 and D2 that the fishery during 1970-71 season was mainly supported by one-year-old fish (125-130 mm total-length); during 1971-72 and 1972-73 seasons by 0-year class (below 125 mm) and during 1973-74 season by one-year-old fish (125-130 mm). Along with the major modes, the simultaneous occurrence of smaller modes was noticed during the present investigation. These small-length modes belonging to the juveniles either indicate the presence of separate broods or the entry of the juveniles produced from the late spawning. It is also in agreement with the observations of Prabhu and Dhulkhed (1967) and Balan (1971). It has been noticed that the success of the fishery depends on the rich recruitment of juveniles belonging to the 0-year class. The 0-year class suffered a decline during the 1970-71 season and 1973-74 season. However, the one-year-old fish was found in abundant quantities and supported the fishery during those two seasons.

From the length-frequency-distribution trends during the four seasons, it has been observed that the rate of growth was relatively fast among the smaller size groups viz., modes G (75 mm in September 1971) and K1 and K2 (70 mm and 60 mm in October 1972). The older fish belonging to the two-year-old groups represented by the modes A1, A2 (at 170 mm in August 1971) and C (175 mm in July 1970) were observed to grow rather slowly and gained only 15 mm of length increment in the course of twelve months.

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