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21 Fishery, biology and resource characteristics of golden anchovy, *Coilia dussumieri (Cuv & Val)*

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ABSTRACT

Coilia dussumieri (Cuv & Val) forms an important component of dol net fishery. Maharashtra and Gujarat contribute 10022 t and 14745 t respectively, while West Bengal and Orissa land 4000t and 586 t respectively. The species is a pelagic zooplankton feeder, feeding mainly on copepods, ostracods, sergestes and young ones of fish. It spawns once in life during April-June. Size at first maturity has been estimated as 162 mm for females and 160 mm for males. The growth parameters estimated are Loo = 230 mm and K = 1.35. The total mortality coefficient (Z) is 5.468 and MSY 16395 t, whereas the average yield is 8509 t indicating that the fishing is below optimum level and it can sustain increased effort up to 126%.

Introduction

Coilia dussumieri (Cuv & Val) is an important bycatch of dol net. The gear is operated in the areas of strong tidal current up to the depth of 45m (Setna, 1949 and Gokhale, 1957). Of late it is being landed in equal quantity by trawlers in Maharashtra. The species forms an important fishery in Maharashtra and Gujarat. It is also landed in West Bengal and Orissa along with another species *C. ramcarti*. A number of workers have contributed to the knowledge of its biology, notable among them are Palekar and Karandikar (1953), Bal and Joshi (1956), Gadgil (1965), and Fernandez and Devaraj (1996).

Materials and methods

The catch and effort data collected by the Fishery Resources Assessment Division of C.M.F.R.I. were utilized for the present study. In addition to length data from dol net off Bombay, biological informations viz. food and feeding habits, maturation and spawning etc. were also collected. Growth parameters like Lœand K were estimated using ELEFAN 1 programme (Gayanilo *et al.* 1988). Mortality estimates were made following Pauly's (1982) length converted catch curve. MSY estimate was made using relative yield per recruit programme of ELEFAN 2. Yield (catch in weight) and stock biomass were predicted for various levels of fishing effort using length converted Thompson and Bell analysis (Sparre, 1985). The output of Jones length cohort analysis, namely, the recruitment and fishing mortalities formed the inputs for length converted Thompson and Bell analysis.

Craft, gear and areas

Craft engaged in the fishing are plank built Satpati type boat, *machwa* mostly mechanised with 5 to 45 hp engine. However non-mechanised boats are also still in operation in Gujarat. Gear in vogue is bag net called "dol" net of 40-70 m in length with cod end mesh 15-27 mm. A smaller version of bag net with 5 mm cod end mesh called "Bauxi" is also used in the creeks. The operation of the gear have been described by Setna (1949), Gokhale (1957) and Raje and Deshmukh (1989). The fishing is conducted from 10-45 m depth in the area of tidal influence. It is also landed by shrimp trawlers in Gujarat and Maharashtra as bycatch.

Fishery

Maharashtra: The catches in Maharashtra ranged from 7921 t (1992) to 13195 t (1985). The average landings during last 10 years was 10022 t. The decline in landing was evident from 1992 onwards when the catches were in the range of 7921 to 8952 t. Districtwise catch indicated that Thane contributed 12.1%, Bombay 62.9%, Ratnagiri 20.4% and Raigadh 4.6%. Majority of the landings of the species were by trawlers. CPUE indicates that peak abundance was during January-March.

Gujarat: Though less number of units were in operation in Gujarat compared to Maharashtra, *C. dussumieri* contributed 9273 t (1987) to 25306

t (1991) with an average of 14765 t showing an increasing trend. Besides dol net, trawl net also contributed to a large extent to its fishery. January-April was the peak period of abundance (Khan, 1986).

West Bengal: The fishery that accounted for 490 t in 1985 reached a peak 4349 t in 1992 indicating a rising trend. However, in the last few years the catch has stabilised to 4000 t. The principal gear employed was dolnet.

Orissa: The catches ranged from 180 t (1989) to 2143 t (1986) with an average 586 t.

Biology

Food and feeding

Studies on the food and feeding habits indicated that the species fed mainly on young ones of *Acetes* spp., prawns, copepods, ostracods, amphipods and young fish and larvae. This is in confirmity with earlier findings by Bapat and Bal (1950). Copepods which formed 97% of zooplankton formed only 14.7% in the stomach, whereas ostracods which formed 1% in the zooplankton samples formed 8.8% in the stomach. Similarly *Acetes* spp. abundant in zooplankton formed 23.7% of stomach content and fish larvae 3.5% in the stomach. Therefore, these two items appear to be the preferred food of *C. dussumieri*.

Maturity and spawning

Monthly sex ratio studies indicated dominance of males over females during January to May. However, statistically significant differences were observed in February, May and July indicating the migration of females from the nursery area to breeding ground. The size at 50% maturity was 160 mm for males and 162.5 mm for females.

Monthly studies indicated high percentage of mature specimens through out the year. Most of the mature ova is in the size-range of 50 to 60 micrometer division. However, some fishes with larger ova, measuring 80 to 100 micrometer division with hyaline border, were observed during January to May indicating that the fish spawns during summer months. Larger sized ova in the size range of 0.85 to 1.1 mm were recorded during December-April by

Palekar and Karandikar (1953). Ova diameter studies indicated the presence of two batches of ova 10 to 14 and 50 to 60 micrometer division in the ovary.

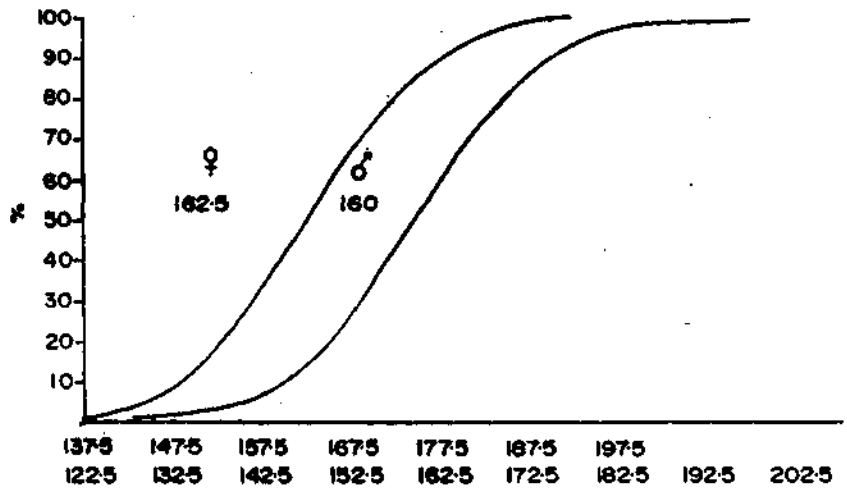

Fig.1. Size at first maturity of *C.dussumieri.*

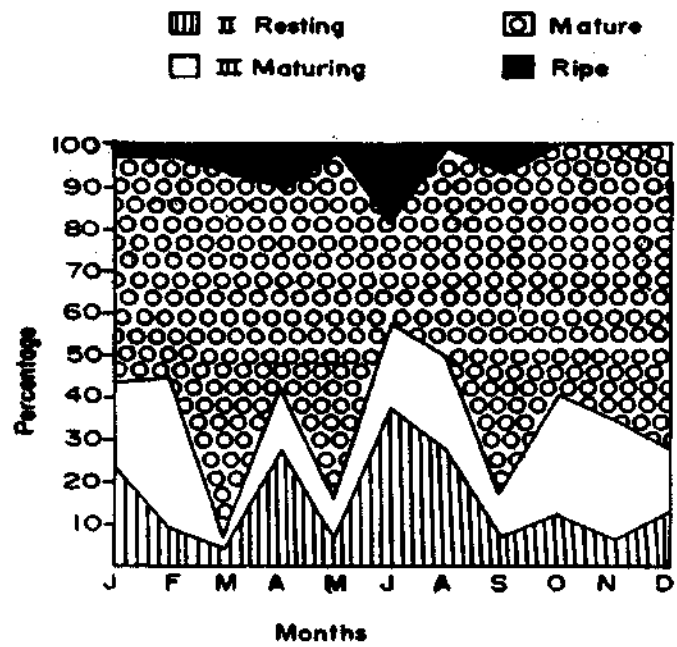

Fig.2. Average monthly gonadal condition of female *C.dussumieri* (Maharashtra).

Recruitment pattern

Recruitment studies indicated two peak periods one in May-July at 93.04% and the other minor one, corresponding to the peak spawning period of April-June.

Age and growth, mortality and stock size

Age and growth: The size ranged from 22 to 200 mm. The growth parameters estimated were: $L\infty$ = 230 mm and K = 1.35 (annual). Fernandez and Devaraj (1996) estimated $L\infty$ as 22.2 cm to 27.2 cm and K = 1.07 to 1.49 (annual). The species grows to 171 mm in the first year and the life-span is less than 2 years.

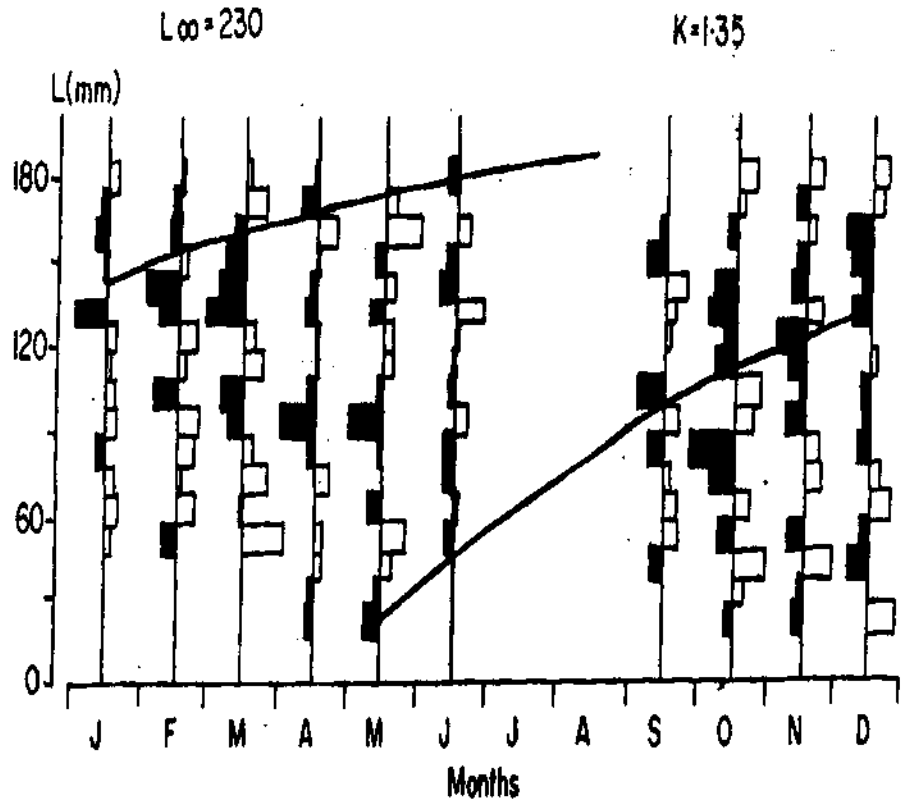

Fig. 3. Growth curve of *C.dussumieri* based on ELEFAN I output (Maharashtra).

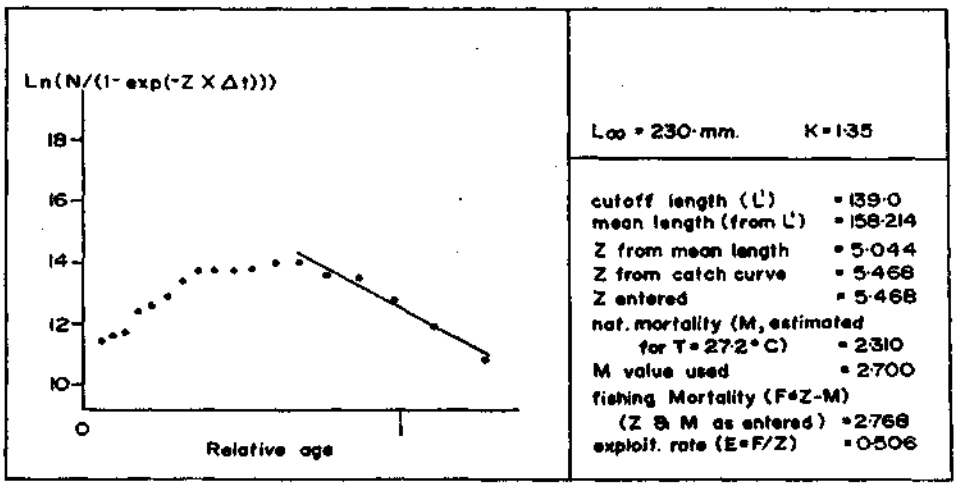

Fig. 4. Estimation of instantaneous mortalitey coefficient *(z)* of *C.dussumieri* (Maharashtra) by catch curve.

Total mortality coefficient (Z) was estimated by length converted catch curve as 5.468 with correlation coefficient of 0.9. The estimated Lc was 136.8 mm and MSY was 16395 t. However, the length cohort analysis and Thompson and Bell long term forecast indicated MSY of 9302 t at an effort of 2.26 times more than the present level of fishing. Thompson and Bell long term forecast indicated that the effort can be increased to 126% than the present level.

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