Indian Journal of Fisheries 40 (3) : 189–192, September 1993

Some aspects of biology of *Alepes djedaba* (Forsskal) from Veraval, Gujarat

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No information is available on the biology of *Alepes djedaba* (Forsskal) from North-West coast of India. Hence, investigations on some aspects of biology of this species were made. The results are presented in this communication.

Random samples of *A. djedaba* were collected from the commercial landings of trawl and gill nets operated by mechanized boats at Veraval. Total length (mm), weight (g), sex ratio, maturity stage of females and gut contents were recorded from fresh samples. The maturity stages were classified according to I.C.E.S. system. For estimating the fecundity, 5% formalin-preserved ovaries in stage V were used. The food of the species was analysed by volumetric and occurrence methods. The index of preponderance was calculated by the method of Natarajan and Jhingran (1961).

Length–weight relationship

For the study 80 males (168–334 mm; 47–270 g) and 73 females (151–336 mm; 27.5–227.5 g) were used. The relationship was calculated separately for the sexes by the method of least squares. The regression equations obtained for both the sexes are as follows:

Males : $\log W = -4.8048 + 2.9228 \log L.$
Females : $\log W = -4.3806 + 2.7403 \log L.$

The significance of difference between the regression coefficients for males and females was tested by analysis of covariance following Snedecor and Cochran (1967). The difference was significant at 1% level. Therefore, a single equation to express the length–weight relationship in *A. djedaba* is not justified and separate formulae as above have to be used for males and females.

Relative condition

Relative condition factor (K_n) was calculated by employing the formula

$$K_n = \frac{W_o}{W_c} \times 100$$

where W_o is observed weight, and

W_c is calculated weight (Le Cren 1951).

The relative condition factor in relation to different sizes showed 3 peaks at 200, 240 and 280 mm for both the sexes (Fig. 1). These peaks might be associated with maturation of gonads.

Females in stage V of maturity were from 190 mm. Similarly, sexually mature speci-

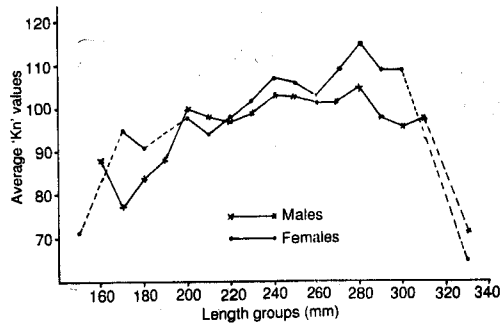

Fig. 1. Average 'K_n' values in relation to different sizes of *A. djedaba*

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mens of *A. djedaba* were observed in above 170 mm F.L. (194 mm in T.L.) by Venkataramani *et al.* (1983–84) at Porto-Novo.

Table 1. Percentage occurrence of males and females of *A. djedaba* in different months

Months	No. of specimens examined	Percentage of males	Percentage of females
January	28	53.57	46.43
February	45	40.00	60.00
March	3	66.67	33.33
April	18	35.71	64.29
May	14	69.23	30.77
June	13	61.54	38.46
August	5	40.00	60.00
November	7	71.43	28.57
December	26	73.08	26.92
Annual	159	54.09	45.91

Sex ratio

Males dominated over females in the population. The distribution of the two sexes during different months showed random variations without any trend (Table 1).

Spawning

The presence of maturing and mature specimens in most of the months, indicated prolonged spawning in this species (Table 2). Further investigations are needed to confirm the period of active spawning. Prolonged spawning season among other carangids was observed in case of *Megalaspis cardyla* (Sreenivasan 1978), *Caranx kalla* (Kagwade 1967) and *Decapterus dayi* (Sreenivasan 1981) along Kerala coast.

Fecundity

Five ovaries in stage V were examined. The number of eggs produced by fish of different lengths were: 270 mm – 621 600, 278 mm – 622 145, 284 mm – 624 799, 301 mm – 766 553 and 303 mm – 806 386.

Table 2. Percentage compositionn of different stages of maturity of females of *A. djedaba* in during January to December 1986

Months	No. of specimens	Percentage of different stages		
		I and II	III and IV	V and VI
January	13	61.53	15.39	23.08
February	27	93.34	6.66	—
March	1	—	100.00	—
April	10	55.56	33.33	11.11
May	5	40.00	40.00	20.00
June	5	—	100.00	—
August	3	33.33	33.34	33.33
November	2	—	100.00	—
December	7	57.14	14.29	28.57

The fecundity of this fish increased with length and it ranged from 621 600 to 806 386. A similar trend in fecundity of *C. kalla* was observed by Kagwade (1968).

Feeding intensity

The feeding intensity was assessed based on the distension of the stomachs, which were categorized as gorged, full, 3/4 full, 1/2 full, 1/4 full, trace and empty. The empty stomachs occurred in high percentage (57.23%) during the year (Table 4).

Food constituents

According to the index of preponderance (Table 4) of various food items in the guts of *A. djedaba*. *Acetes* spp. formed the dominant food item followed by copepods, fish, *Myctophum* spp. and *Squilla* spp. The contribution of *Acetes* spp. was more than 50% in all the months, whereas fish, copepods, *Myc-*

Table 3. Monthly percentage of stomachs in different degree of fullness in *A. djedaba* during 1986

Months	No. of specimens	Gorge	Full	3/4 full	1/2 full	1/4 full	Trace	Empty
January	28	—	10.71	10.71	14.29	14.29	7.14	42.86
February	45	8.00	8.00	—	4.00	16.00	12.00	52.00
March	3	—	33.33	—	33.33	—	—	33.34
April	18	—	—	—	7.14	—	7.14	85.72
May	14	—	—	—	—	20.00	10.00	70.00
June	13	—	—	—	—	53.85	23.08	23.07
August	5	—	—	—	—	—	—	100.00
November	7	—	14.29	—	28.57	—	14.29	42.85
December	26	7.69	15.38	3.85	11.54	11.54	—	50.00
Annual	159	3.14	8.18	3.15	11.32	11.95	5.03	57.23

Table 4. Index of preponderance of food items of *A. djedaba*

Food items	Volume % V_i	Occurrence % O_o	Index of preponderance $I_i = \frac{V_i O_i}{V_i O_i} \times 100$	Grading
Acetes spp	45.83	80.03	93.24	I
Copepods	18.75	9.31	4.44	II
Miscellanceous items	16.67	2.43	1.03	III
Fish	12.50	2.16	0.68	IV
Myctophum spp.	4.17	5.40	0.57	V
Squilla spp.	2.08	0.67	0.04	VI

tophum spp. and *Squilla* spp. formed significant part of the diet during May, January, February and November respectively.

The present investigation revealed that *A. djedaba* fed on crustaceans and fishes. Venkataramani *et al.* (1983–84) reported crustaceans and fish in the stomach content of this species from Porto-Novo, Tamil Nadu coast. They also observed that among crustaceans *Acetes* spp. and copepods dominated. This is in agreement with the present observations. The food study indicated that *A. djedaba* is a pelagic carnivore. More or less similar type of feeding habit was also observed in *C. kalla* (Kagwade 1967), *M. cordyla* (Sreenivasan 1974) and *D. dayi* (Sreenivasan 1979).

ACKNOWLEDGEMENTS

I thank Shri S Reuben and Shri K S Sundaram for critically going through the manuscript; Dr A P Lipton and Shri V M Deshmukh for their encouragement; and Shri K H Dhokia, M S Zala and B P Thumber of

Technical staff for the help during the collection of data.

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